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Editor—Henry E. Sigerist

Associate Editor—Genevieve Miller

Volume XX JULY, 1946 Number 2

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OF THE NINETEENTH ANNUAL MEETING OF

THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE

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THE FIELDING H. GARRISON LECTURE

SCIENCE IN AMERICAN UNIVERSITIES 1636-1946

With Particular Reference to Harvard and Yale *

JOHN F. FULTON

Mr. President, Members of the Association of the History of Medicine, and guests:

The name of Fielding H. Garrison is one that will ever command respect and admiration among scholars concerned with the history of medicine and science, and since he foresaw so clearly that scientific endeavor would come to play a major part in our social life and in our national and international thinking, I have chosen as a topic for this annual discourse a theme in which Dr. Garrison was himself deeply interested—namely, the story of how the sciences, particularly the laboratory sciences, have become insinuated into the structure of American universities.

I am in complete agreement with one of our more thoughtful scholars, Dr. Max Fisch, who maintains (1)** that the history of science will be writ large in university curricula of the future because it is replacing the classics as an academic discipline. It is absolutely essential, however, that humanistic study be retained in our academic curriculum whatever else may be sacrificed. If Latin and Greek must go, and if the more erudite disciplines of logic and philosophy are to be minimized in an age of science, the young scientist, if he is to have any contact with humanistic thinking, must gain it from study of the history of his own particular field—be it mathematics, physics, astronomy, chemistry, or atomic energy. More than fifty years ago Osler began to preach a similar doctrine to students of medicine.

* The Fourth Fielding H. Garrison Lecture. Read on 27 May 1946 at Atlantic City, New Jersey, at the annual meeting of the American Association of the History of Medicine.

** Dr. Fisch writes that there is "a saying of William James that almost anything can be given humanistic value if you teach it historically. The best way to preserve the values of old-fashioned liberal education in the science-dominated curriculum and culture that we are moving into, is to make a larger place for the history of science in education. Now the history of science will require a focus, and I think it is an interesting and important fact that already a large part of the work that has been done in the history of science has had a focus in medicine, taking medicine in the broad sense in which it includes psychiatry at one end and public health at the other. I believe that medicine will continue more or less indefinitely to be for educational purposes as well as other purposes the most fruitful for the history of science. I should like to predict for the future a large place in our culture and in our education for the history of science with a focus in medicine in that sense."

He deplored their limited practical training and attempted to give them a sound knowledge of the medicine of history, the medicine of literature, and the influence of physicians on the tide of events in military, social, and literary history. This was Osler's concept of medical humanism and we can now perceive much broader vistas in the growth of a similar humanism in the sciences.

Garrison's interest in general science is evident in his choice of Josiah Willard Gibbs as a subject of biographical study. Until he had published his four papers on Gibbs in *The Popular Science Monthly* (2) Gibbs' work, like that of Einstein and Pauli, had remained for the few; his theories were discussed by many, but understood by only a handful of mathematical physicists. Garrison had managed to comprehend the more applicable of Gibbs' deductions and he interpreted them for general readers in language that was readily understood. Although there have been later and more detailed biographical studies of Gibbs, no one has written of him more lucidly or more intelligently than Garrison. And since Gibbs stands as one of the commanding figures in science, we owe to our great medical historian an incalculable debt for having thus made him known to the world. Gibbs received his Yale B. A. in 1858 after which he became a Latin tutor in Yale College. Working at mathematics on the side, he was awarded a Ph. D. in 1863—the third to be given by Yale. How did it happen that Yale in 1871 appointed Gibbs a Professor of Mathematical Physics? To answer this question one must look back historically to the position of the sciences in American universities.

The slow acceptance of the laboratory sciences by American academic institutions reflects the conservatism of the European prototypes on which our early American colleges were modelled. Mathematics and astronomy had had some representation in the Italian and French universities of the 16th century and professorships of medicine can be traced even earlier. But the other physical sciences, such as chemistry and physics, and the biological sciences were slow to take hold. Indeed, so conservative were the universities of Europe in the 17th century that those teaching the sciences were obliged to seek sponsorship largely outside university walls (3). The scientific societies of the 17th century, such as the *Leopold Academy* in Germany, the *Accademia dei Cimento* in Italy, the *Académie des Sciences* in France, and the *Royal Society of London*, were largely responsible for fostering the work of such men as Malpighi, Pascal (4) and in England, leaders such as Robert Boyle, Robert Hooke, Richard Lower, and somewhat later, Isaac Newton. Newton, almost alone among early British

scientists, had formal university recognition. Scientists had congregated at Oxford but the University was slow to adopt them. To be sure, Christopher Wren, the precocious young mathematician of All Souls, was appointed to the Savilian Professorship of Astronomy at an early age, but Robert Boyle, who worked out the gas laws while at Oxford, had no formal connection with the University. Indeed it is no exaggeration to say that following the Renaissance the study of science progressed in Europe in spite of university conservatism (5) and often in the face of active opposition from academic sources.*

Colonial Science in the 17th Century

Thanks to the scholarly account of *Harvard College in the 17th century* compiled by Samuel Eliot Morison, we have a number of significant details concerning the teaching of science, especially mathematics and astronomy, at Harvard during the 17th century (6). From Cambridge University the early Harvard tutors had acquired a number of texts in arithmetic and geometry. Henry Dunster, one of the early presidents, had been a student at Magdalene College, Cambridge, and had brought with him to Harvard a handsomely illustrated quarto of Ranus' *Arithmeticae Libri Duo: Geometriae Septem et Viginti*, which was energetically forced upon the students of the period.

Because tracts of land in the vicinity of the early settlement had not yet been surveyed, and because the coast line presented many hazards to navigation, practical courses were offered at Harvard in the early days on surveying and navigation. All this prompted a further interest in mathematics and astronomy, and one finds more in the way of active study of these scientific subjects in the colonies during the 17th century than in the 18th century. To John Winthrop, Jr., Governor of Connecticut, Harvard owed its first important scientific instrument (7). When visiting London in 1661 for the purpose of obtaining a charter for the Connecticut Colony, Governor Winthrop renewed his acquaintance with British men of science and became a foundation member of the Royal Society of London. When he returned to Connecticut he brought with him a telescope, three-and-a-half feet in length, through which, on 6 August 1664, he believed that he had observed a fifth satellite of Jupiter.†

* The details of Oxford science in the 17th century have been fully covered (but not critically) in R. G. Gunther's series, *Early science in Oxford*, which extends to thirteen volumes (1923-1938).

† The satellite was not observed officially until 1892 when discovered by Barnard of

While in England Winthrop, in pursuing his scientific interests, had come to be on intimate terms with the energetic first Secretary of the Royal Society, Henry Oldenburg, who urged Winthrop "to season and possesse the youth of New England" with "this reall Experimental way of acquiring knowledge, by conversing with, and searching into the works of God themselves" rather than following the "notional and disputatious school of philosophy."

Early in 1672 Winthrop, since Connecticut at that time had no college, presented Harvard with his telescope which was enthusiastically acknowledged by Nowell, Brown, and Richardson, the three compilers of astronomical almanacs (8). The Winthrop telescope was put to good use, and in 1680 when the comet, later known as Halley's comet, came well into the visible area, it was closely studied by Thomas Brattle, one of the more precocious of the younger tutors, and by both Cotton and Increase Mather. Brattle's remarkable observations on the comet were sent to Edmund Halley, then Director of the Royal Observatory at Greenwich, and used by Newton in making his first cometary computation. "Our little college telescope," Morison writes (p. 221), "contributed its mite toward helping Newton to test Kepler's three laws, to work out the law of gravitation, and to write his great work." Brattle also observed a solar eclipse with the same telescope in 1694 and made a notable report on the subject in the *Philosophical Transactions* (9).

Making a claim for Harvard's 17th century modernity, Morison writes: "It is abundantly clear that the Copernican system was officially sanctioned and taught at Harvard at least as early as 1659; that the college tutors were alert to learn of new discoveries in Astronomy, and prompt to 'season and possesse the youth of New England with this reall Experimental way of acquiring knowledge'; that the College possessed a telescope as early as 1672, with which observations useful to Sir Isaac Newton were made; and that this group of young Harvard scholars, Brigden, Cheever, Nowell, the Mathers, and above all Thomas Brattle, were in their small and humble way worthy predecessors of the Bonds and the Pickerings and Harlow Shapley." But although the Copernican system was officially sanctioned, there were many at Harvard and elsewhere who had not yet accepted it even at the end of the 17th century. At Yale, shortly after its foundation, students were allowed to choose whether they would learn the astronomy

the Lick Observatory. Brasch (7) and others believe that Winthrop must have seen a faint star in close juxtaposition to the planet, for it would have been quite impossible with his small telescope to have visualized Jupiter's small fifth satellite.

of Ptolemy or the astronomy of Copernicus. Encouraged by the gift of the telescope from John Winthrop and the active influence of Thomas Brattle, it is thus evident that mathematics and astronomy had grafted themselves into the early curriculum at Harvard.*

The second college to be founded in the colonies was William and Mary in Virginia which began to receive students in 1693. The only formal instruction in science probably came after the 17th century and was given by the Reverend Hugh Jones who lectured on Natural Philosophy and Mathematics. But we have little information concerning the content of his lectures because the early records of the college were destroyed by fire.

Science in the 18th Century

At the beginning of the 18th century attention came to be centered upon the colonies' third institution of higher learning, which had been founded at Branford in the Connecticut Colony—later to be known as Yale College in honor of Elihu Yale who in 1718 had made a gift of books to the struggling college and a sum of £562 12*s*. Just prior to this, Mr. Jeremiah Dummer, Colonial Agent for Connecticut at London, was in 1714 asked to secure books and scientific apparatus for the new college. Dummer promptly sought the advice of Isaac Newton, who had a deep interest in promoting higher learning, and from his own shelves Newton generously handed Dummer a copy of the second edition of the *Principia,* which had then just been published, and a first edition of his *Opticks*. Both volumes have survived and can still be seen in the Rare Book Room of the Yale University Library.

Frederick E. Brasch, in his illuminating study entitled " The Newtonian epoch in the American colonies 1680-1783," (10) has described the impact of the Newtonian philosophy on the Calvinistic Puritan thought of the 18th century colonials. Harvard, which had welcomed the Copernican system, was curiously unreceptive to the mechanical philosophy of Newton, and throughout the 18th century went on teaching the older concepts of mathematics and astronomy. It is of some interest, however, that the first endowed Chair of Mathematics and Philosophy was established at Harvard in 1727 by Thomas Hollis, the wealthy London merchant. Isaac Greenwood, the initial incumbent of the new chair, although he offered to teach a course in Newton's fluxions, is said never to have mastered the

* Brattle had received a B. A. from Harvard in 1676 and an M. A. in 1679; later he served for some thirty years as treasurer of Harvard College.

Newtonian system and for that reason thought it inadvisable to give a course on Newton's philosophy (10).

Yale, on the other hand, was more receptive to Newton despite the theological conservatism existing in New Haven—to which city the college had moved in 1718. Two young tutors, Samuel Johnson and Daniel Browne by name, were seniors in the college when the new edition of the *Principia* arrived, and from 1714 the Newtonian philosophy was accepted and taught at Yale. Yale was fortunate in its early presidents, for while they all had strong theological leanings, they were remarkably openminded for their times, and when the conflict lay between Calvin and Newton, a shrewd realism, which has generally characterized Yale presidents, caused Newton to come out on top. During President Clap's administration (1739-1756) a course in fluxions, based on Newton, was introduced and taught by the president himself; he possessed and used an orrery and was indefatigable in the pursuit of meteors.

One of Clap's pupils, Nehemiah Strong, who had been graduated in 1755, was called to a new professorship of Mathematics and Natural Philosophy in 1770. In 1781 Strong published a textbook of astronomy entitled *Astronomy improved* (11). Here, for the first time in an American text, one finds a clear statement of the laws of gravitation as they operate in the planetary system. But since the shadow of John Calvin was ever in the background, Strong cautiously made reference to the Almighty as being responsible for the laws of gravitation.

The most versatile of Yale's presidents in the 18th century was Ezra Stiles, who took over the reins of office in 1778 at a time when the college was having serious financial setbacks on account of the Revolutionary War. When Strong retired from the chair of mathematics (somewhat under a shadow, as he had not been wholly sympathetic with the Revolution) funds were lacking for a new appointment and the new president took over the lectures on mathematics and natural philosophy with energy and enthusiasm and by so doing greatly increased Yale's prestige in science

Meanwhile other institutions of learning were springing up in the colonies. Princeton opened its doors in 1746; Washington and Lee in 1749; the University of Pennsylvania in 1751 (not 1740); Columbia, then called Kings College, in 1754; Brown University in 1764; and Dartmouth College in 1770. The latter was founded by Eleazar Wheelock who had received his degree from Yale in 1733. Jonathan Dickinson (Yale 1706) was the first president of Princeton, and Jonathan Edwards (Yale 1720) took over the presidential duties for a brief time at a later date. Samuel

Johnson (Yale 1714) became the first president of King's College. Thus were the Newtonian concepts spread from their primary focus in the new world.

Silliman and the Scientific Schools 1800–1846

American universities entered upon the 19th century with few chairs in any of the basic sciences, save for mathematics and astronomy, but through the influence of men such as Benjamin Franklin and David Rittenhouse, and also of Joseph Priestley, who had settled in Pennsylvania in 1794, the universities were obliged to take cognizance of the growing importance of physics (particularly of electricity), chemistry, geology, mineralogy, and engineering. Princeton established the first American chair of chemistry in 1795, this having been held initially by John Maclean, a talented Scotsman who had studied with Lavoisier at Paris and who proceeded to attack Priestley's notions about phlogiston soon after Priestley came to this country (12).

But during the first half of the nineteenth century the man who did more than any other to establish scientific faculties in American universities was Benjamin Silliman, who, in the year 1802, at the early age of twenty-three, was appointed to a newly created chair of chemistry and natural history. Of Swiss origin, the family (who originally spelled their name "Sillivant") had migrated in the early 17th century and settled at Fairfield, Connecticut. Entering Yale in 1792 at the age of thirteen, Silliman was graduated in 1796, after which he studied law as well as chemistry, botany, and geology. He was admitted to the bar in 1802, the year of his appointment to his new professorship in Yale College. Realizing that he was still poorly equipped in the sciences, he took the greater part of his first two years in the chair preparing for his new duties, first at Philadelphia where he was much influenced by Robert Hare, the distinguished chemist and physicist, and by John Maclean, who had already made a name for himself in American science. Silliman's first lectures at Yale were given in the spring of 1804, and in 1805 we find him in England where he came to be on terms of intimacy with Sir Humphry Davy, who was one year Silliman's senior and, like him, already embarked on a career of conspicuous scientific attainment. He also met David Brewster, John Murray, and Thomas Polk. Silliman was a systematic man who kept elaborate notes on his lectures and reading, and he was also given to keeping full travel diaries, the latter serving as a basis for his

well-known book, issued in 1810, *A journal of travels in England, Holland, and Scotland,* which gave a highly illuminating account of his year in Europe.

Silliman made himself particularly well liked abroad and, having thus become intimate with important personages in science, he was able not only to keep his laboratory up to date, but, through his associations, to keep Yale and other American universities in close touch with scientific institutions abroad. Soon after his return he became one of the most sought-after lecturers in the United States; and through his undergraduate teaching and his public lectures he soon attracted a large following which did much to direct the attention of the country in general, and of the conservative Yale Corporation in particular, to the importance of the sciences.* He was especially eager to extend the opportunity for study in all phases of science at Yale College and his influence in this direction extended far beyond his generation, but it was many years before his labors bore fruit.

Science on Trial, 1847–1869

The introduction of the laboratory sciences into the curricula of the older American universities occurred in a significant way which deserves close study. The conservatism of the governing bodies both at Harvard and Yale was such that the proponents of laboratory study were obliged to establish scientific schools which were largely independent of the universities themselves. The laboratory which later became the Sheffield Scientific School was organized during 1846-1847 without financial support from the Yale Corporation, and in 1847, with Louis Agassiz as its director, the Lawrence Scientific School was established at Cambridge, also without financial help from the Harvard Corporation (15).† The two scientific schools soon were recommending bachelor of science degrees in their own right, and in 1861 Sheffield granted a degree of Doctor of

* One of Silliman's major achievements was the founding of the first American periodical devoted to science—*The American Journal of Sciences and Arts* ("and Arts" omitted after 1880). See the centenary number, fourth series, vol. 46, pp. 1-416, which contains a detailed review of the progress of the separate sciences during the 19th and early 20th centuries. The journal still flourishes in its fifth series under the editorship of Professor R. S. Lull of Yale.

† At Harvard, by vote of the Corporation on February 13, 1847, the Lawrence Scientific School was established as "an advanced school of instruction in theoretical and practical science and in the other usual branches of academic learning," although it was not named the Lawrence Scientific School until June, 1847 when Abbott Lawrence gave $50,000 for the endowment of the new school.

Philosophy, the first postgraduate doctorate ever to be given in this country.

Having thus come into being as entities separate from the university proper, both the Lawrence and the Sheffield Scientific Schools became jealous of their independence and, being familiar with the theological slant of their respective university corporations, for many years they resisted being absorbed into the university. This tendency had certain advantages since the expansion of science could thus take place without the limitation of the conservative classical faculties. But there can be little doubt that in the long run the desire of the scientific schools to maintain themselves outside the university wrought a considerable disservice both to the university and to the cause of postgraduate education in the sciences. In this regard Harvard was perhaps more fortunate than Yale since through the aggressive leadership of Charles Eliot, himself a chemist, the advantages of introducing science courses into the bachelor's curriculum were quickly grasped. From 1869 when Eliot became president of Harvard until 1906 when the Lawrence Scientific School was dissolved and taken over by the University, Eliot made every effort to bring the science departments under the direct jurisdiction of the college. The faculty of Lawrence for a long time resisted and three separate attempts instigated by Mr. Eliot in 1886, in 1897, and again in 1904 all failed, but in 1906 Eliot's dream of a Graduate School of Applied Science established within the framework of organization of Harvard College itself became a reality. The governing boards of Lawrence and of Harvard College adopted the following far-sighted vote:

> That there be established in Harvard College the degree of Bachelor of Science without designation of any field of study, the requirements for admission of students intending to become candidates for this degree to be the same as the present requirements for admission to the Lawrence Scientific School, and the requirements for graduation to be the same as the requirements for the degree of Bachelor of Arts in respect to number of courses required, grade of work demanded, and length of residence;
>
> That there be established in Harvard University a Graduate School of Applied Science;
>
> That the subjects in which degrees may be granted in this Graduate School be, for the present, Engineering, Mining and Metallurgy, Architecture, Landscape Architecture, Forestry, Applied Chemistry, Applied Biology, and Applied Geology;
>
> That a Bachelor's degree or its equivalent be required for admission to the Graduate School of Applied Science;
>
> That the degree of Bachelor of Science with designation of the field of study on completion of any one of the present four-year programmes of the Lawrence Scientific School continue to be offered until the further order of this Board.

The Graduate School of Applied Science thus replaced the Lawrence Scientific School and undergraduate and postgraduate study in the laboratory sciences became for the first time officially incorporated in the college curriculum of our oldest academic institution.

The story of the infiltration of science at Yale is even more revealing. The Yale Corporation had been largely unmoved by Benjamin Silliman despite his enormous popularity and public acclaim, but he had inspired others to work for the same cause, and early in 1846 when it became known that an unknown donor had given $5,000 for the establishment of a professorship in agricultural chemistry and of animal and vegetable physiology provided Yale would raise $20,000; and when he found that one of his former students, John Pitkin Norton, had returned to New Haven, Silliman went before the Corporation " with his usual promptness in the cause of science . . . and presented the importance of having such a professorship in some way connected with the college."

The result was a vote by the Corporation in August authorizing the appointment of John Pitkin Norton as Professor of Agricultural Chemistry and Animal and Vegetable Physiology and of Benjamin Silliman, Jr. as Professor of Practical Chemistry, but the Corporation failed to appropriate the stipulated $20,000. This was the beginning of the Sheffield Scientific School. Charles H. Warren, who has recently retired as Director of Sheffield, writes that the School (14) " which rapidly became a center of scientific culture and perhaps Yale's most distinctive contribution to American education was the direct fruitage of Silliman's influence."

Attached to the vote of the Corporation authorizing the appointment of Norton and the young Silliman was a statement that the support of these professors was in no case to be charged to existing funds or revenues of the College. Their compensation was to be derived exclusively from fees for instruction and for other services. Despite this somewhat negative endorsement, the new scientific department, known during its first year as the " School of Applied Chemistry," flourished in the beginning largely as a result of Norton's energetic persistence. His courage and his faith in the future of science were shortly rewarded by an enrollment greater than either he or the Yale Corporation had anticipated. But although the number of students was encouraging, the income from their fees was a mere pittance compared with the cost of maintaining the laboratory, and August of 1849 finds the two young professors petitioning the Corporation for a reduction in the annual rent of $150 which they were being charged for the use of the laboratory. This request was granted, but it was subject to revocation when the Corporation saw fit (13).

At the end of 1849 Benjamin Silliman, Jr. withdrew to accept a professorship of chemistry at the University of Louisville, disposing of his interest in the laboratory to Norton. In addition to this added responsibility Norton was endeavoring to spread interest in the practical application of science by extensive lecturing and writing, but this rigorous regime was too much for one of rather frail health and he died tragically at the early age of thirty, five years after his appointment. One of his last acts was to give all his laboratory equipment, books, etc. to the College subject to the department's being continued. However, this valiant attempt to establish a scientific department at Yale might have collapsed had it not been for another young graduate (Class of 1842), John Addison Porter, who was deeply interested in natural science. Porter, following his graduation, had studied for two years in Germany with the eminent chemist Justus von Liebig where "he acquired not only a broad knowledge of chemistry but also a high appreciation of the importance of agricultural chemistry, for Liebig had, in Germany and elsewhere, demonstrated the benefits to be derived from the more scientific treatment of the land and in the cultivation of crops."

Porter proved an exceedingly wise choice. He had an attractive personality, he had gained valuable experience in his two years at Brown University teaching "chemistry as applied to the arts," and he was deeply interested in the work which Norton had inaugurated. The Yale Corporation, much impressed by the number and character of the men who were soon applying for admission to the School of Chemistry, began to be more receptive to suggestions from the School, though their support was still on a moral basis with no financial assistance. In the academic year 1852-1853 the student enrollment consisted of 4 in general courses, 25 in the School of Chemistry, and 26 in the new School of Engineering which had been created that year (again through the influence of Benjamin Silliman, Sr.) by the establishment of a chair in civil engineering that another pioneering Norton, William Augustus, had accepted, also without stipend from the Corporation. On the basis of this increase in the number of students, the catalogue for 1854-1855 refers to the "Yale Scientific School," and one finds that Porter had recommended a separate chair of metallurgy, which George J. Brush was invited to occupy. Soon other professorships were created and men thoroughly prepared in this country and abroad were added to the faculty.

Meanwhile, Porter had married the daughter of Mr. Joseph Earl Sheffield, a railroad engineer, financier, and philanthropist, who was

thoroughly aware of the importance of science in the development of national resources. In response to various appeals Sheffield first made a donation of $10,000 to the School. Later he purchased a suitable building, equipped it completely with scientific apparatus, and presented it along with a gift of money. In 1861 the Yale Corporation, in recognition of Mr. Sheffield's munificence, adopted the name of the " Sheffield Scientific School."

Further support, much needed by the steadily growing school, came in 1862 when the Congress of the United States, under Mr. Lincoln's wise persuasion, passed an " Act donating public lands to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts." The state universities, or " land grant colleges " as they were first designated, came into being as a result of this farsighted Congressional legislation. Sheffield, whose leaders had been interested in the science of agriculture from the first, was the only school in Connecticut to apply for funds accruing from the sale of these public lands. The result was an additional endowment of $135,000 which made possible forty-three free scholarships for students in Connecticut. This in turn called for an enlarged faculty, and in 1863 a man of exceptional stature, Daniel Coit Gilman, was added to the teaching staff as Professor of Physical and Political Geography. Gilman, who had obtained a B. A. from Yale in 1852, had published an epic paper (16) on the scientific schools of Europe in 1856 on his return from study abroad. He thus brought to Sheffield knowledge of the unusual strides being made in scientific instruction on the Continent and particularly in Germany, which for a brief time was outstripping other nations.

Gilman also brought to his new professorship an indefatigable energy which prompted him to go out of his way to make known the needs of the School and to bring its work before the general public. It was here that the man who was destined to do as much, if not more, for postgraduate education in the United States than any other individual, began his career. It has been recorded that his colleagues relied on him in times of storm and stress and that " he was especially active in bringing before the people of the state the significance of the new education in science emphasizing the view that scientific schools were a logical indication of the spirit of the age, a manifestation of the desire for an advanced education on some basis other than the literature of Greece and Rome " (17).

We now come to Josiah Willard Gibbs who in 1863 was granted the third doctorate to be given by Sheffield, the same year in which Gilman

was appointed to its faculty. Gilman apparently kept an eye on Gibbs and doubtless used his influence to secure for the shy, unprepossessing young scientist his appointment to a full professorship of mathematical physics in Yale College in 1871, for one of Gilman's noted talents was his ability to select men, as was so brilliantly demonstrated later when he picked out the original faculty of Johns Hopkins University. In 1876 when Gilman accepted the presidency of Johns Hopkins, and began to organize the new university in Baltimore, Gibbs was his first professorial choice, but Gibbs elected to remain at Yale (18).

Although Sheffield lost Gilman, other men of similar stature who had the interests of the School much at heart, came to the foreground. Russell Chittenden, who had been attached to the School since 1872, became Professor of Physiological Chemistry in 1882, then Director, 1898-1922. The School continued to attract both undergraduate and graduate students from far and wide as its reputation grew and its graduates brought distinction to themselves and their alma mater. Proud of its record, Sheffield zealously guarded its individuality and continued to exist largely independent of Yale College.

In 1920 the Sheffield governing board and the Yale Corporation faced the fact that the time had come for some integration in the undergraduate courses and a common freshman year was established. The students of Sheffield now began to mingle more freely with students of Yale College and the line between the two was less sharply drawn. It was not until November 1944 that by vote of the Yale Corporation a Division of Science was created as an integral part of Yale College with responsibility for supervising all undergraduate instruction in the natural, physical, and mathematical sciences. Graduate instruction in these fields was to be given by the faculty of the Sheffield Scientific School. This new organization went into effect July 1, 1945—Yale at long last could be said to have taken science to her bosom.

In 1867 Daniel Coit Gilman had made a memorable statement in an article on "Our national schools of science" printed in the *North American Review:*

> Never, probably, in the history of the country, was it more desirable that the study of History, Law, Political Economy, Philosophy, Literature and all the humanities should be kept up, and that young men should learn to value the lessons of the past, and to take counsel from the thoughts of the wise men of every age and country. Heretofore, the complaint has been, that the classics were the only means of liberal education. Henceforward, science will offer its aids to intellectual culture in organized schools. Both classes of institutions will flourish side by side,

and each will be strong in the other's strength. The Creator and his laws, man and his development, or, in other words, science and history, alike offer abundant discipline for the mind and appropriate preparation for the active work of life.

Now, eighty years later, his prophesy is coming true. Although the acceptance of science in our universities has been often slow and hard-won, there has been steady progress, which gives abundant promise that the day is not far distant when the study of the history of science will assume the place so long occupied by the classics in the curricula of our colleges and universities (1; see also 19).

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THE WILLIAM OSLER MEDAL ESSAY

THE PART PLAYED BY ELECTRIC FISH IN THE EARLY HISTORY OF BIOELECTRICITY AND ELECTROTHERAPY

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Undoubtedly the first bioelectric phenomenon of which man became aware was the electric discharge of certain types of fish. Marine creatures possessing electric organs inhabited the waters of the earth long before the advent of mankind.[1] Various members of the class ostracodermi for example, Devonian fossil fish of the family *Cephalaspidae*, are characterized by bilateral polar fields which are believed to have been electrical in nature. Throughout the ages electric organs in several species of fresh and salt water fish, notably the *Torpedo mamorata, Malopterurus electricus* and *Gymnotus electricus* have reached a high degree of development and are capable of delivering a very painful and paralysing shock. These three species happen to be found near the sites of ancient civilizations, and it is probable that their uncanny power has been a source of fear and superstitious conjecture from very primitive times.

The earliest man-made records in which electric fish are represented are the fishing scenes depicted on the walls of certain Egyptian tombs. The oldest of these, the burial place of the great architect Ti, at Sakkara, dates from the Vth dynasty (*ca.* 2750 B. C.), and it is particularly interesting to note (see plates I, II and III) that the electric fish represented, namely the Nile catfish *Malopterurus electricus*, is very naturalistically drawn, as indeed are the other fish appearing in these murals. It might reasonably be expected that the ancient Egyptians, an inquisitive and intelligent people, would have taken considerable interest in the remarkable endowments of this fish so common in the waters of the Nile, yet it is a curious fact that the first known Egyptian work to mention the electric catfish is dated some time in the 4th century A. D. The *Hieroglyphica* of Horapollo, the earliest attempt to interpret the ancient inscriptions, records that the malopterurus was employed as a hieroglyph to denote "a man who had saved many in the sea," the basis for the ideograph being the sup-

[1] Stensiö, E. A. *The Dowtonian and Devonian vertebrates of Spitzbergen Pt. I.*, Oslo, 1927, pp. 235-245; see also, Jaekel, O. M. Ueber einen Torpediniden und andere Fischreste aus dem Tertiar von Kamerun (in Esche, E. *Beiträge zur Geologie von Kamerun.* Stuttgart, 1904, pp. 287-291.

PLATE I.

Plates I, II, and III. Bas-relief from the Tomb of Ti at Sakkara. The *Malopterurus electricus* is the fish, in Plate I which is crossed by the boating pole; in Plate II which is the central fish in the group and in Plate III which is above and to the left of the owl in the frieze at the bottom. (Gaillard, *Memoires de l'institut français d'archaeologie orientale du Caire*, 1923, Plates I-III).

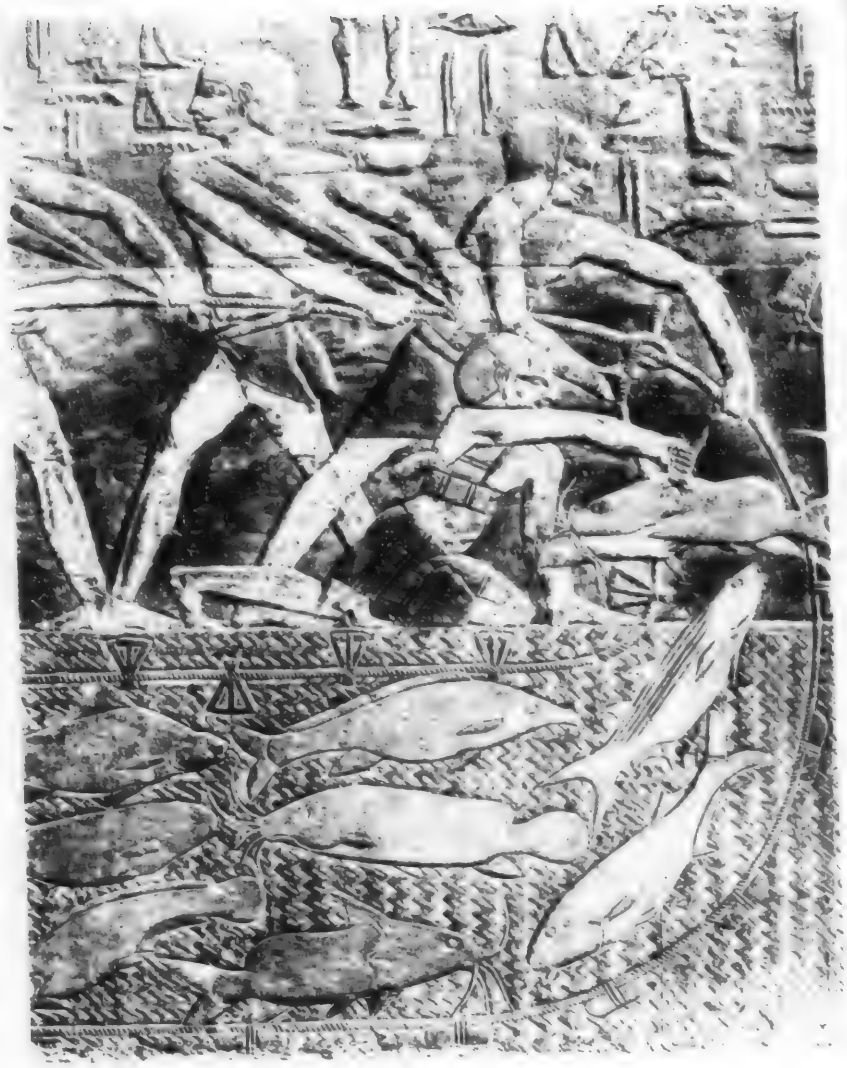
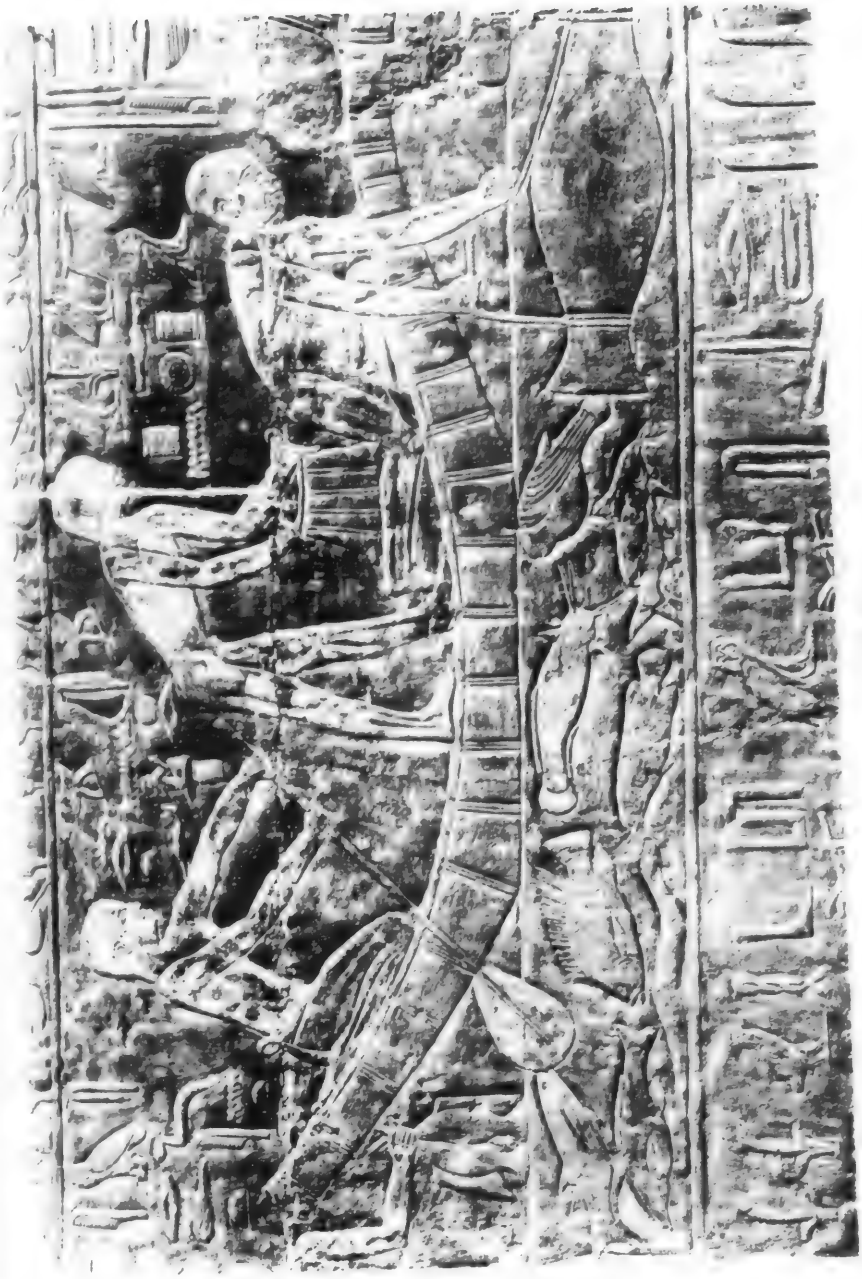


PLATE II.



posed fact that "the fish in times of danger takes smaller fishes upon its back!" [2] While it is true that pictures of living creatures of many different species were used in inscriptions to convey ideographic meanings, no such representations of malopterurus have as yet been found by modern archaeologists and it is very likely that the story was a product of Horapollo's fertile imagination.[3]

Sir Gardner Wilkinson [4] adduces from the singular absence of Egyptian reference to *Malopterurus electricus* that the fish "was most sacred and forbidden for food." This explanation seems unlikely, however, for the electric catfish is not listed by Greek historians among the fish venerated by the Egyptians [5] nor is it one of the three fish which have been found in mummified form in ancient tombs.[6] The Oxyrhynchus, Phagrus and Lepidotus are in fact the only fish mentioned by the early writers as being sacred, and Plutarch [7] explains that these three owed their sanctity not to any special properties they possessed but to the fact that they devoured the genital organs of Osiris after he had been slain by Typho and cast into the Nile.

Thus in spite of the fact that its unmistakable lines appear in many early fishing scenes nothing has been extracted from the ancient inscriptions which throws any light on what the Egyptians knew or thought of the electric catfish; even its Old Egyptian name is unknown.[8]

[2] Horapollo. *The Hieroglyphics of Horapollo Nilous.* Trans. by A. T. Cory, London, 1840, II, p. 104.

[3] The story is nevertheless repeated by the 16th and 17th century Egyptian philologists, as in fact are most of the other erroneous interpretations of the *Hieroglyphica*. Nicolas Caussin (*De symbolica Aegyptorum*, Kickium, 1631, p. 52) was inclined to believe however that the Greek translator of the work mistranslated this section and that Horapollo was referring to the Nautilus not to the electric catfish (??). Valeriano Bolzani (*Ieroglifici*, Venice, 1602, p. 438) believed that the translation of the fish's name was correct but offered his own explanation of the ideograph. He thought that the fish was used to denote a man who had saved many in the sea, because when caught in a net it shocked the fishermen and thus allowed other enmeshed fish to escape.

[4] *Popular Account of the Ancient Egyptians*, Vol. II, p. 192.

[5] Herodotus, Bk. II, Ch. 72, "Only the Phagrus and Lepidotus are venerated"; according to Strabo, Bk. XVII, Ch. 1, Sect. 40, the oxyrhynchus was especially sacred in the city bearing its name and the oxyrhynchus and lepidotus sacred to all Egyptians.

[6] Lortet and Galliard, *Faune momifiée de l'ancienne Egypte.* Arch. du Musée de Lyon VIII, 1903. The oxyrhynchus is also substituted in certain stelae for the 'bird soul' see Mahler, E.: "Das Fischsymbol auf Ägyptischen Denkmalern." *Zeitsch. Deutsch. Morgenländ.*, 1913, *67*, 37-48.

[7] *Isis and Osiris.* Aelian (*Hist. Animalium*, Bk. X, Ch. 46) however claims that the oxyrhynchus was produced from the blood of Osiris.

[8] Thomson, D'Arcy W. On Egyptian fish-names used by Greek writers. *Jour. Egypt. Archaeol.*, 1928, *14*, 27.

Actually, the Egyptian mural paintings of *Malopterurus electricus* antedate the earliest written reference to an electric fish by almost four thousand years, and in the light of subsequent history it is interesting to note that this first record occurs in the works of a physician. The second book of the treatise *On Regimen*, one of the works included in the Corpus Hippocraticum, and one incidentally, which Galen [9] considered worthy of the father of medicine himself, treats of the dietetic values of various animal and vegetable foods. Of the fifty-three animal species discussed, eighteen are fishes, among them one with the suggestive name νάρκη (*narke*).[10] The root of the modern term "narcosis," νάρκη was also the Greek word for "numbness," but unfortunately it is not always possible to know to which fish the name is being applied, for the Greeks apparently used it interchangeably for both the electric catfish of the Nile and for the electric ray of the Mediterranean—two fish possessing similar numbing properties but differing entirely in appearance and in habitat. Some authors, however, render the reader a small measure of assistance by adding the adjective "sea" in the case of the electric ray. Thus Athenaeus, enumerating the fishes of the Nile, lists simply ἡ νάρκη but later distinguishes ἡ θαλαττια νάρκη.[11] This understandable inclination to designate all electric fish by the same name because of their similar powers has persisted, and it is not uncommon to find in comparatively recent literature the Latin name for the electric ray (torpedo) applied to the electric catfish and even to the electric eel.

The Ancients' Ideas Concerning the Electric Discharge

There is no doubt that the numbing force of the electric fish was known to the early writers, and that the ancient name was synonymous with the effect,[12] as the following passage from Plato's dialogue *Meno* so nicely illustrates:

[9] Kühn, VI, 473. Galen says that he considers the first book of the treatise to be spurious but that he regards the second as being worthy of Hippocrates. Soranus (*Life of Hippocrates*, VII, 154) attributes the treatise to Herodicus of Selymbria, the mentor of Hippocrates.

[10] Littré, VI, 549.

[11] *Deipnosoph*, VII, 312b and 314b. This distinction which also occurs in many other writers including Plato and Galen, may however have been used to differentiate between the fish νάρκη and the plant centaurea which was also sometimes referred to by the name νάρκη see Dioscorides, III, Sect. 8.

[12] Oppian, *Halieutica*, I, 104. "The narke rightly named . . ."; III, 153. "The pain which gives the fish its name . . . ." "Torpedo," the English name for the electric ray is taken from the Latin and as Varro (*De Lingua Latina*, Bk. V, Sect. 12, p. 77) affirms the name is derived from the fish's physical properties.

O Socrates, I used to be told before I knew you that you were always doubting yourself and making others doubt; and now you are casting your spells over me, and I am simply being bewitched and enchanted, and am at my wits end. And if I may venture to make a jest upon you, you seem both in your appearance and in your power over others to be like a torpedo fish, who torpifies those who come near him and touch him, as you have now torpified me, I think. For my soul and my tongue are really torpid and I do not know how to answer you . . ."[13]

An interesting fact about the last part of this passage is its resemblance to the description of the torpedo's shock given by Plato's pupil Aristotle[14] in his *Historia Animalium*: "The torpedo narcotizes the creatures that it wants to catch, overpowering them by the power of shock that is resident in its body, and feeds upon them; it also hides in the sand and mud, and catches all the creatures that swim in its way and come under its narcotizing influence."

Although he refers to the torpedo's power to numb or narcotize its victims, Aristotle does not mention in any of his extant works the remarkable fact that the effect may be transmitted to a distance.[15] It seems hardly possible that he could have been unaware of the curious phenomenon, especially as it undoubtedly was common knowledge to every Greek fisherman, and we can only surmise that he either dismissed the fact as specious or that he reserved it for special comment in some work now lost. The latter possibility is the more likely however, for Antigonus of Carystus[16] who apparently extracted the greater part of his data from Aristotle's *Wonderful Relations*, a work of which only a few fragments remain, infers that contact is not always necessary for the torpedo's shock to be effective. Theophrastus, esteemed pupil and foster-heir of the great Stagirite, certainly knew that the *narke* could benumb the hand of a fisherman through the length of a line or trident, for he says so in his book *On Biting and Venomous Animals*.[17] Another of Aristotle's pupils, Clearchus

[13] Jowett translation, 1892, p. 39, Sect. 80.

[14] IX, 630b. Book IX is regarded by most editors to be non-Aristotelian and has been ascribed to Theophrastus (see e. g. Dittmeyer's edition, 1907, VII).

[15] Vincent de Beauvais writing in the early part of the 13th century says, "As Aristotle testifies, the *narke* possesses the following power: through the line and the rod the hand of the fisherman that holds it is struck by numbness and insensitivity." (*Speculum Naturale*, Strasbourg 1478, Bk. XVI.) As none of the existing manuscripts of the *Historia Animalium* are dated earlier than the 12th century it is possible that there were available to Vincent books such as the *Wonderful Relations*, which are no longer in existence. See however Athenaeus (VIII, 314), "as Aristotle says . . . it catches the little fishes for its food by *touching* them causing them to grow numb and motionless."

[16] Keller trans. *Rerum Naturalium Scriptores Graeci Minores*, 1877, Ch. 53.

[17] Quoted by Athenaeus, VII, 314b.

of Soli, one incidentally who because of his dilettant habits [18] probably did not stand high in the master's favor, wrote a treatise, *περι ναρκης* [19] which may also have dealt with the problem. Certainly by the end of the second century B. C., the phenomenon was definitely recognized, for the physicist Hero of Alexandria [20] in explaining the ability of light to pass through water casually draws an analogy between this process and the ability of the torpedo's shock to penetrate through iron, brass and other solid substances.

One of the most accurate of the early descriptions of the torpedo's powers occurs in an essay by an author who although he often discoursed on natural phenomena, did not profess to the naturalists' estate. This essay, which is written in the guise of a debate as to which are the most crafty, water or land animals, abounds in zoological information not all of which is as factual as the account which follows:

> You know yourself the property of the torpedo or cramp fish, which not only benumbs all those that touch it, but also strikes a numbness through the very net into the hands of them that go about to take it. And some that have had greater experience of this fish report that if it happens to fall alive upon the land, they that pour water upon it shall presently perceive a numbness seizing upon their hands and stupefying their feelings, *through the water affected with the quality of the fish*. And therefore having an innate sense of this faculty, it never takes any resistance against any thing nor is it ever in danger. Only swimming circularly about his prey, he *shoots forth the effluviums of his nature* like so many darts, and *first infects the water, then the fish through the water* which is neither able to defend itself nor escape, being (as it were) held in chains and frozen up.[21]

Plutarch, the author of this exerpt, was not a trained observer in natural science but depended for his facts upon his extensive erudition and infallible memory; it would be interesting to know from whence he obtained his information. It is possible that he owed his knowledge of the torpedo to Theophrastus and Clearchus of Soli.

Pliny, an older contemporary of Plutarch may also have read the works of these authors, especially as he made it his business as compiler and encyclopedist to study most of the important books available in his time. His references to the torpedo, however, are characteristically abstruse and

[18] Athenaeus calls him *τρεχέδειπνος* or the "diner-out." His catholic tastes are mirrored in the variety of subjects about which he chose to write; *On Osteology, On Riddles, On Proverbs, Love Stories, Lives*, etc. (these titles are taken from various places in Athenaeus).

[19] Quoted by Athenaeus, VII, 314C.

[20] *Pneumatica*, I, Introduction. Teubner Ed., p. 26.

[21] Plutarch, *Morals*, 978B. The italics are mine.

lacking in factual basis. He claims, for instance, that " from a considerable distance even, and if only touched with a spear or staff this fish has the power . . . of riveting the feet of a runner, however swift he may be in the race." [22] Nevertheless it would be a mistake to pass over Pliny's *Natural History* without comment, for it is one of the few existing sources of the folklore and necromancy of ancient Rome, and in a subsequent section we shall consider in some detail the weird and recondite pharmacy involving the wonderful fish which a study of Pliny's book affords.

The three professed naturalists of antiquity, Aristotle, Pliny and Aelian, are disappointing in the data they supply concerning the electric fish. Aristotle makes no reference to the fact that the discharge may be transmitted through solid objects, and Pliny [23] and Aelian [24] have little more than fabulous tales to offer. In contrast, reports of the torpedo given by three laymen, an historian, an orator and a poet, are much more accurate and complete. The historian, Plutarch, has already been quoted. The orator, Cicero,[25] was the first to point out the biological value of the fish's shock which he considered a weapon of defence. The poet Oppian,[26] in his 3,506 verses on fish and fishing, gives one of the most factual and precise accounts of the torpedo written by an early author.

Sir Thomas Browne [27] wrote of Oppian that he thought him " one of the best epic poets," and while this opinion may not be shared by all classical scholars the majority agree that his verses have considerable charm and grace. Sir Thomas was also impressed with the strict regard for truth that characterizes Oppian's lines, and Bashford Dean,[28] himself a master ichthyologist, has called Oppian the most important of all the ancient writers on fish and fishing. It may perhaps be added without exaggeration that his *Halieutica* was the most accurate and comprehensive ichthyological treatise up to the time of the publication of Belon's *De Piscibus*, 1548. The verses dealing with the torpedo, quoted below, are

[22] *Natural History*, XXXII, 2. Isidore of Seville repeats the story in his *Etymologiae*, Bk. 12, Ch. 6; and so does Albertus Magnus (12th century) *De Animalibus* XXIV, 1, 58. The latter adds that a friend of his who touched the fish " only slightly with the end of his finger," for six months was barely able to restore sensation in his arm and hand even with the use of " baths and unguents."

[23] *Op. cit.*, IX, 24, 42, 51; XXXII, 9.

[24] *Historia Animalium*, V, 37; IX, 14; XIV, 3.

[25] *De Natura Deorum*, II, Ch. 50, Sect. 51.

[26] It is often said that Oppian's works were based on personal observation. Wellman (*Hermes*, 27 & 51) however, after careful study, believes Alexander of Myndos and Leonidas of Byzantium to be the main sources of the *Halieutica*.

[27] *Vulgar Errors*, Bk. I, Ch. VIII, Sect. 9.

[28] *Bibliography of Fishes*, Vol. III, p. 295.

taken from the amusing, if somewhat free translation made by Jones and Diaper and published by them in 1722:

The Cramp-Fish, when the pungent pain alarms,
Exerts his magick Pow'rs and poison'd Charms.
Clings around the Line, and bids th' Embrace infuse
From fertile Cells comprest his subtil Juice
Th' aspiring Tide its restless Volumes rears,
Rolls up the steep Ascent of slipp'ry Hairs,
Then down the Rod with easy Motion slides
And entring in the Fisher's Hand subsides.
On every Joint an icy Stiffness steals,
The flowing Spirits binds, and Blood congeals
Down drops the Rod dismist, and floating lies,
Drawn captive in its Turn, the Fish's Prize.[29]

The Pow'r of latent Charms the Cramp-Fish know,
Tho' soft their Bodies, and their Motion slow.
Unseen, foreboding Chance of future Prey,
The crafty Sluggards take their silent Way.
Stretcht from each Side they point their magick Wands,
Whose icy Touch the strongest Fin commands;
Quick thro' the whole it shoots the rushing Pain,
Freezes the Blood, and thrills in ev'ry Vein;
Strikes all that dare approach with strange Surprize,

[29] Note the similarity of these lines to Claudian's verses on the torpedo (*Carminum minorum*, XLIX (XLVI), Loeb edition);

"Who has not heard of the invincible skill of the dread torpedo and of the powers that win it its name?

"Its body is soft and its motion slow. Scarcely does it mark the sand o'er which it crawls so sluggishly. But nature has armed its flanks with a numbing poison and mingled with its marrow chill to freeze all living creatures, hiding as it were its own winter in its heart. The fish seconds nature's efforts with its own guilefulness; knowing its own capabilities, it employs cunning, and trusting to its power of touch lies stretched full length among the seaweed and so attacks its prey. It stays motionless; all that have touched it lie benumbed. Then, when success has crowned its efforts, it springs up and greedily devours without fear the living limbs of its victim.

"Should it carelessly swallow a piece of bait that hides a hook of bronze and feel the pull of the jagged barbs, it does not swim away nor seek to free itself by vainly biting at the line; but artfully approaches the dark line and, though a prisoner, forgets not its skill, emitting from its poisonous veins an effluence which spreads far and wide through the water. The poison's bane leaves the sea and creeps up the line; it will soon prove too much for the distant fisherman. The dread paralysing force rises above the water's level and climbing up the drooping line, passes down the jointed rod, and congeals, e'er he is even aware of it, the blood of the fisherman's victorious hand. He casts away his dangerous burden and lets go his rebel prey, returning home disarmed without his rod."

Similar lines also occur in a poem by Manuel Philes (ca. 1275-1345) *De proprietate animalium, edidit Corneille de Pau.* Utrecht, 1730, p. 21.

Stiffens the Fin, and dims the mazed Eyes.
Conscious of secret Pow'r, a Gift divine,
On Sands, as dead, the Cramp-Fish lies supine,
Thus careless stretcht a wide Destruction makes,
And wand'ring Shoals without her Labour takes.
Fixt sudden they the numming Torpor feel;
The Parts contract, the Fluids all congeal.
No more the busy Messengers of Sense
Motion around, and conscious Life dispense;
Nor flowing Streams the circling Heart diffuse,
But the chill'd Parts forget their former Use.
While urg'd by pleasing Hopes, to fresh Repast
The willy Cramp-Fish moves with aukward Hast.
Oft, as the nimble Swimmers heedless pride
In active Course, and curling Streams divide,
They lifeless stretch by sudden Pains confin'd,
And secret Chains the fetter'd Captives bind.
No more they wanton dive, or giddy roam,
Vault on the Seas, and vex the rising Foam;
Dull Rest they now, and fatal Slumbers love,
Nor backward can retreat, nor forward move.[30]

As when in Dreams imagin'd Forms appear,
When dreaded Sounds we distant seem to hear,
Or shady Ghosts with silent Horror rise,
And Spectres glare before the sleeping Eyes,
Fearful of coming Ills we sweating lie,
And willing would from fancy'd Dangers fly:
Rooted we stand, the Heart incessant beats,
And hasty Strokes the quicker Pulse repeats.
Lab'ring to move we seem to strive in vain,
While pond'rous Clogs the struggling Feet retain.
With such a binding Force the Cramp-Fish stays
The swiftest Fish, and strikes with dizzy Maze.
One Touch of her's dams up the vital Flood,
Contracts the Nerves, and clots the stagnate Blood.

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[30] This passage is reminiscent of the description given by Diodorus Siculus in his *Library of History* (Bk. II, 12.) of the fate of swimmers in a certain wonderful lake in Babylonia. "And there is across the river a lake whose edge offers solid footing, and if any man unacquainted with it, enters it he swims for a short while, but as he advances towards the center he is dragged down as though by a certain force and when he begins to help himself and make up his mind to turn back to shore again, though he struggles to extricate himself it appears as if he were being hauled back by something else, and he becomes benumbed first in his feet then in his legs as far as the groin, and finally overcome by numbness in his whole body, he is carried to the bottom, and a little later cast up dead." One wonders about the content of the Babylonian lake; the malopterurus is not believed to occur outside Africa.

A remarkable feature of this description is Oppian's apparent knowledge of the fact that the electric discharge arises not from the whole fish but only from certain parts of it. The electric organs of the torpedo are located on each side of the body between the pectoral fins and the head, and it is evident that Oppian is referring to these organs when he says that the shock is resident in "two rays planted in its sides." [31] Perhaps he knew of the experiments purporting to prove this which Athenaeus [32] reports were performed by one Diphilus of Laodicea. It was thirteen hundred years before the theory was again put forward by Jerome Cardan,[33] and another hundred years before Francesco Redi [34] and his pupil Stephano Lorenzini [35] provided experimental evidence to substantiate it as fact.

Oppian's use of such non-committal terms as "a craft" [36] to designate the torpedo's discharge is typical of the language employed by the ancients when referring to this phenomenon. The exact nature of the force underlying the benumbing powers of the electric fish was an issue which the majority of the early writers carefully avoided. Galen indeed was the only one who made any attempt to solve the problem. He ascribed the cause of the numbness to a certain frigorific principle [37] he believed to be inherent in the fish and peculiar to it.[38] Always reasoning, Galen no doubt reached this conclusion through recognition of the similar effects produced in the body by the action of severe cold. He was also aware that the action of the electric discharge, like that of cold, is effective either by direct contact or by contact through an intervening conductor.[39]

Galen's hypothesis was widely embraced by his successors and a contradictory theory was not advanced until Averroes published his great medical work, the *Colliget*, some time in the 12th century. This physician was of the opinion that the force exerted by the electric fish was analogous to the force exerted by the lodestone on iron,[40] a concept which was later developed by the Jesuit monk Athanasius Kircher.[41] In 1571 Mercurialis [42] suggested that the shock of the torpedo depended upon some special

[31] *Halieutica*, II, 63.
[32] *Op. cit.*, 314d.
[33] *De rerum varietate*. Bk. VII, Ch. 32.
[34] *Esperienze intorno a diverse cose naturali*. Florence 1671, p. 47-51.
[35] *The curious and accurate observations of Mr. Stephen Lorenzine of Florence on the dissections of the Cramp-Fish*. London, 1705, p. 66-72.
[36] *Op. cit.*, II, 62.
[37] Kühn, IV, 497; VIII, 72 and 421.
[38] Kühn, VIII, 431.
[39] Kühn, VII, 108-109.
[40] *Colliget*, Tract V, leaf 10.
[41] *Magneticum Naturae regnum*. Amsterdam, 1667, Sect. IV.
[42] *De cognoscendis et curandis Humani Corporis Affectionibus*. Bk. I, Ch. 23, p. 96.

form of poison. The idea had probably occurred to many other thinkers, but evidently no one else had suggested it before because of the difficulty of explaining why the fish was innocuous when dead and could be eaten with impunity. Before the electrical nature of the discharge was finally recognized, two other theories were advanced. Lorenzini [43] considered the shock to be due to the sudden rapid expulsion of microscopic effluvia or corpuscles, and Borelli [44] proposed that the numbness arising from contact with the torpedo resulted from a rapid contraction of the electric organs which he believed to be muscles.

The development of these theories and the story of the ultimate revelation that electricity is the force underlying the shock will be discussed in a future paper now in process of preparation.

Uses in Medicine and Pharmacy

It will be recalled that the earliest written reference to an electric fish occurs in one of the books of Hippocratic Corpus. The first chronicler is not however concerned with the wondrous powers of these creatures but rather with their nutritive value.[45] In his treatise on internal diseases, Hippocrates prescribes for the diet of the phthisic patient a portion of boiled torpedo to be taken each morning for breakfast.[46] Similarly the patient suffering from persistent menorrhagia may, he suggests in another book, derive benefit from the flesh of a torpedo well cooked in coriander and sweet pickle.[47] No mention is made of any special properties possessed by the fish and it is clear that Hippocrates makes the prescription merely because of the tender flesh.[48] The digestibility of the latter is affirmed by Oribasius,[49] who reports that it passes through the gut with great facility and hence is useful for evacuating the stomach. Pliny [50] records that the flesh " softeneth " the belly, and Galen though he agrees with the statement that it traverses the gastro-intestinal tract fairly easily is inclined to deprecate the value of so soft a meat as nourishing food.[51] He adds with marvellous ambiguity, that " of the cartilaginous fish the torpedo is about the only one suitable and convenient for epileptics! " [52] Rufus of

[43] *Op. cit.*, pp. 72-77.
[44] *De motu animalium.* Leyden, 1685. Pt. II, p. 322.
[45] Littré, VI, 549.
[46] Littré, VII, 199.
[47] Littré, VIII, 251.
[48] Littré, VI, 549.
[49] *Oeuvres d'Oribase*, I, 242; Bk. III, Ch. 29.
[50] *Op. cit.*, Bk. 32, Ch. 9.
[51] Kühn, VI, 737.
[52] Junta ed., 1576, Classis 7, Ch. 56, leaf 169.

PLATE IV.

Greek Campanian-ware pinax decorated with prints of a *Torpedo ocellata* and two other fishes (from Blumenbach, J. F., *Abbildungen naturhistorischen Gegenstand*, Göttingen 1810). It is interesting that Artemidorus (*Oneirocrit.*, II, 14) says that it is an ill omen to dream of a torpedo swimming among other fishes.

Ephesus,[53] also without further explanation, subjoins to this list of dietetic virtues the recommendation that the fish be fed to patients with nephritis.

That the Hippocratic writings discuss the torpedo and yet make no reference to its strange powers is not remarkable, for these works are characterized by a rational approach to disease and an almost complete disregard for the marvellous and the esoteric. The simple prescription of easily digested torpedo flesh for the undernourished patient is merely another example of the Hippocratic belief in "natural" therapy, and it stands in sharp contrast to the heavy-handed polypharmacy of succeeding ages.

PLATE V.

Attic krater decorated with a painting of *Torpedo ocellata* (from Laborde, A. L. J. (comte) de, *Collection des vases grecs de M. le Comte de Lamberg expliquée et publiée*. Paris 1813-24).

The writer of the treatise *On Regimen* is merely interested in the qualities and food value of the flesh of various edible animals. The torpedo fish was a common item of food in classical times[54] and is in fact still sold in the market places of many Mediterranean fishing villages. It is listed by Hippocrates among those fish which because of their sedentary

[53] Daremberg ed., Ch. 2, p. 17. See also: Cassius Felix, Ch. 46, Rose Trans., p. 119.

[54] The torpedo is represented on many early Greek fish plates (see illustrations). Athenaeus (314C) quotes several authors concerning methods of cooking and preparing the fish for food. It is also listed by Julius Pollux (*Onomasticon*, Bk. V, Ch. IX, Basle ed., p. 51) as a food fish.

habits have soft flesh and is on this basis recommended in diseases requiring easily digestible food.

In later centuries when the Hippocratic influence was on the wane, and when the superstitious practices of Roman and Oriental folk medicine began to dominate medical thought, fishes of all kinds were regarded as possessing magical properties which rendered them valuable remedial agents. Indeed a Roman physician of the second century, Marcellus of Sida, wrote a medical work in forty-two books, twelve of which were written in verse and devoted solely to the curative qualities of fish.[56] These volumes were held in such high esteem that the Emperor Marcus Aurelius ordered them placed in the public library at Rome, but unfortunately for the student of medical ichthyology only a bare 101 hexameters of the treatise have been preserved for posterity. This fragment probably formed the preface to the work as it consists of a few introductory lines in which Marcellus explains that he has learned from experience that certain fish have remarkable medicinal properties, and a long enumeration of some seventy-four marine creatures which he claims are of special use in therapeutics. One of these is the torpedo, and, although the chapter dealing specifically with this particular fish has been lost, it is not difficult to conjecture from the information supplied by other authors what that chapter contained.

On the basis of what can be garnered from the subsequent writings of Celsus, Oribasius and other compilers, it is apparent that nothing new was added to the medical history of the torpedo after Hippocrates until about A. D. 46, at which time Scribonius Largus introduced the electrical powers of the fish into clinical medicine as a cure for headache and gout. The transition from the pragmatic medicine of the Greek classic period to the undiscriminating folklore of Rome in the imperial era is not an attractive one, for while it is a step forward in time of almost five hundred years it nevertheless represents an enormous step backward in the evolution of medical enlightenment. Scribonius Largus was one of the first Roman physicians, if such he can be named, to attempt to bring some order out of the chaos of ignorance and superstition that characterized native Italian medicine, and before we consider his contributions to electroichthyology it would be interesting to examine the fantastic and often magical remedies that the early Romans devised from the electric fishes.

As Sextius Niger, Dioscorides and Scribonius Largus, the three eminent pharmacists of the first century, eschewed the more loathsome of the

[56] Ἰατρικά, in J. A. Fabricius, *Bibliotheca Graeca*, 1705, pp. 14-20.

popular remedies of their day, it is necessary to turn to the *Natural History* of Pliny in order to obtain a complete picture of ancient Roman medical lore. Although an assiduous and industrious compiler, Pliny made little or no attempt to discriminate between factual and factitious data; and it is this very lack of discrimination which renders his work such a mine of historical information.

He had great faith in animal and vegetable simples for he believed their action to be the direct work of nature [57] and he listed numerous remedies which could be concocted from the fishes common in Italian waters, among them the torpedo. Of the latter's electrical properties he writes, " We find ourselves compelled to admit that there is in existence a certain power, which by the very exhalations therefrom is enabled to affect the members of the human body; what then are we not to hope *from the remedial influence which nature has centered in this and all animated creatures.*" [58] The statement in the light of modern developments in the field of electrotherapy seems at first glance to be one of remarkable insight and intuition. When however we examine the medical uses that Pliny finds for the fish we discover that it is not the electrical discharge that is utilized; instead many mystical pharmacologic virtues are imputed to various parts of the fish when dead. Only once does he specify that a necessary element of the remedy is that the fish be alive, but even then it is not the whole fish that is employed, but only its gall. This substance when applied to the genital organs in the form of a linament is supposed to " coole the wanton lust of the flesh," [59] but it seems unlikely that even the most zealous ascetic would suffer the hazards involved in procuring the remedy from a live electric fish, especially as Galen [60] reports that the fires of excessive venery may be damped by the oral administration of bile obtained from a torpedo of unspecified vitality.

Aphrodisiacs, love-potions and depilatories were favorite topics of discussion among ancient writers on pharmacy. Antaphrodisiacs were less popular, and as a general rule fish and fish organs were considered to have stimulating properties, a characteristic which according to legend they inherited from their protectress Aphrodite. Apart from the inhibitory effect imputed to the torpedo's gall, the electric species are no exception to the rule, the flesh of the malopterurus being considered highly aphrodisiac by the peoples of North Africa,[61] a belief which is probably of very

[57] XXII, 49-56.
[58] XXXII, 2. The italics are mine.
[59] XXXII, 10.
[60] Junta ed., 1576, classis 7, Ch. 56, leaf 169.
[61] See for example: Broussonet, Mémoir sur le trembleur, *Mém. Acad. Sci. Paris*, 1782, 694; and Forskäl, *Descriptiones animalium*, 1775, 18.

ancient origin for reports of it occur in the records of the early travellers in that part of the world. The electric catfish was also reputed by the Islamic authors to be of value as a sort of marital love charm. Al-Quazwine [62] and Ad-Damiri [63] record that if either one of a married couple carry any portion of this fish about their person the other will not be able to bear being separated from him or her, as the case may be, for a single instant.

In the absence of adequate shaving instruments, depilatories must have been very necessary items of the Roman toilet. Their importance to the clean-shaven Romans is clearly illustrated by the numerous recipes for hair-removers that occur in the *Historia Naturalis*, very few if any of which could however have been effective. Even Pliny [64] in a doubting moment warns that " in the case of every depilatory the hairs should be removed before it is applied." Nevertheless he asserts that torpedo brains tempered with alum have a depilatory effect if applied " on the morrow after the moon is in the full." [65] Aelian [66] even goes so far as to say that the flesh of the torpedo, putrified in vinegar and sprinkled with mint, " will bring about the disappearance of hair before the person has grown it."

The last of Pliny's torpedo remedies should be of special interest to obstetricians. " If a torpedo be taken while the moon is in the sign of Libra," he writes, " and be kept for three days out in the open air, (!) so long afterwards as it is brought into the room where a woman is in travail of childbirth, she shall have ease and speedy delivery." [67]

Electrotherapy Introduced?

Of all these amazing ichthyic nostrums by far the most remarkable, and perhaps the most rational was the employment of the torpedo's electric discharge for the relief of intractable headache and for gout. This remedy which represents the first recorded use of electrotherapy, was introduced into clinical practice by the Roman physician and contemporary of Pliny, Scribonius Largus.[68]

[62] *Nushatu-l-Qulub*, English translation of zoological section by J. Stephenson, London, 1928, p. 55.

[63] *Hayât al-Hayawan*, translated from the Arabic by A. S. G. Jayakar, London, 1906-8, p. 68-69.

[64] XXXIII, 10; last sentence. [65] *Ibid.* [66] *Op. cit.*, XIV, 3.

[67] XXXII, 10. He goes on to say that the torpedo " when applied to the region of the spleen will cure the hardness and opilation thereof."

[68] For an interesting study of the man and his work see, Wilhelm Schonack, *Die Rezeptsammlung des Scribonius*, Jena, 1912-13.

Historians characterize Scribonius as a man of sound judgment and high principles. His sole existing work, *Compositiones Medicae*, when examined with regard to the theurgy and superstition that was his heritage, is remarkably free of the scientifically contemptible recipes so common in the medicine of that period. Scribonius confesses however that in his quest for remedies he gleaned from every likely person he encountered including slaves and wise women. Indeed he lists the electro-ichthyic remedy for gout on the basis of a report that Anteros, a freedman of Tiberius, had been successfully treated for the disease by this means.

> For any type of gout a live black torpedo should, when the pain begins, be placed under the feet. The patient must stand on a moist shore washed by the sea [69] and he should stay like this until his whole foot and leg up to the knee is numb. This takes away present pain and prevents pain from coming on if it has not already arisen. In this way Anteros, a freedman of Tiberius, was cured.[70]

Scribonius gives no source for his galvanic headache remedy and it is possible that he originated it himself. A " transcriptive relator " perhaps, but no mere copyist, most historians give Scribonius the credit for the first application of electricity to medicine. It is evident from the wording of the prescription that its author, as Galen [71] has pointed out, intended to employ the numbing force of the electric discharge because of the narcotic or anodyne effect it would have on the patient. " Headache even if it is chronic and unbearable is taken away and remedied forever by a live black torpedo placed on the spot which is in pain, until the pain ceases. As soon as the numbness has been felt the remedy should be removed lest the ability to feel be taken from the part. Moreover several torpedoes of the same kind should be prepared because the cure, that is, the torpor which is a sign of betterment, is sometimes effective only after two or three." [72]

The herbal of Dioscorides written some thirty years after the *Compositiones* not only adopts the use of torpedo viva for headache but avers that the remedy may be successfully employed in prolapsus ani.[73] Largely through the influence of Dioscorides' reputation these remedies enjoyed a great popularity for many centuries and in fact may be found in herbals and pharmacopoeias up to the end of the seventeenth century.[74] Marcellus

[69] Note precautions taken to keep the torpedo alive.
[70] Scribonius, *op. cit.*, CLXII.
[71] Kühn, XII, 365.
[72] *Compositiones Medicae*, XI.
[73] *Herbal*, II, 17. Goodyer's trans., 1655, Oxford, 1934.
[74] See for example: Robert Lovell, *Panzooryctologica, sive Panzoologicomineralogica*, 1661, p. 191.

of Bordeaux [75] copied the headache recipe word for word from Scribonius Largus but it is obvious from their mention of prolapsus ani that most of the other writers that list the remedy such as Aetius,[76] Ali Abbas,[77] Avicenna,[78] and Serapion,[79] obtained it either directly from Dioscorides or indirectly through Galen.

One wonders if the electrotherapeutic treatments for prolapsus ani represent the first intentional stimulation of muscles by artificial means. The shock of even a dying torpedo is of considerable intensity and certainly of sufficient magnitude to induce involuntary contractions of semi-striated muscles. In this connection it is interesting to note that one of the earliest, if not the first, observation that the musculature of " dead animals " may be stimulated by electricity occurs in the chronicle of a Jesuit traveller in Abyssinia. This man, Nicholas Godinho,[80] noted that a newly-caught torpedo when thrown on a pile of " dead " fish seemingly caused the latter to come to life.

In the sixteen hundred years immediately following the introduction of torpedo applications for headache, gout and prolapsus ani, apparently only one man questioned the efficacy of such treatments. That man, as one might guess, was Galen [81]—" I have trusted none that tell of such things," he wrote of remedies in general, " until I have tried them for myself." Hence though he had a high opinion of Dioscorides,[82] he did not hesitate to subject this procedure to the test. " The whole torpedo, I mean the sea-torpedo, is said by some to cure headache and prolapsus ani when applied. I indeed tried both of these things and found neither to be true. Therefore I thought that the torpedo should be applied alive [83] to the

[75] *Marcellus de Medicamentis*, ed. Helmreich, I, p. 28.

[76] *Tetrabiblion*, I. Sermo secundus, p. 185. The following sentence is of special interest " . . . mortua vero, aut omino non, aut modice haec facit."

[77] *Liber Regius*, Practica, II, 52. He calls the fish " pisces dormitans! "

[78] *Canon*, II, tract 2, p. 553. Venice, Junta ed., 1608, I, p. 376. The Arabic name for the electric fish " alrahada " is used. Variations of this name are " Raa'ád," " rahadh," " r-rā-âdah "; also see El-Beydawee, *Commentary on the Kur-án*, 18, II, for interpretation of the name. It means " trembling," not " thunder " as some authors have thought.

[79] Serapion, II, 3; " piscis stupefaciens! "

[80] *De Abassinorum rebus*. Leyden, 1615, Bk. 7.

[81] Kühn, IV, 513.

[82] Kühn, XIV, 61-62.

[83] Though he was familiar with the *Compositiones* of Scribonius, Galen was probably thinking of the recipe as given by Dioscorides who does not mention that the torpedo fish should be alive. This is shown also by the fact that Galen mentions " prolapsus ani " which is mentioned by Dioscorides but not Scribonius.

Sir Thomas Browne (*Vulgar Errors*) says: " Thus also the torpedo which alive hath power to stupefy at a distance, hath none upon contaction being dead, as Galen and Rondeletius particularly experimented."

person who has the headache, and that it could be that this remedy is anodyne and could free the patient from pain as do other remedies which numb the senses: this I found to be so. And I think that he who first tried this did so for the above-mentioned reason." [84]

Of all the early writers to comment on the subject, Galen it will be recalled was also the only one who made any attempt to explain the nature of the force involved in the torpedo's discharge. He attacked the problem by defining first the torpor produced by the shock, which he says "is composed of a difficulty of motion and sensation seen clearly in the whole body and especially in the limbs." [85] Then having clarified the symptoms, he proceeds to the conclusion that this state is due to a "frigidity and compression of the nervous bodies." [86] The immediate inference is that Galen, in accord with his four humour theory, believed the action of the discharge to depend upon some sort of frigorific principle. Certainly his successors understood him to mean something of that nature for they made elaborate efforts to extract the principle and store it for emergency use. Thus in the sixth century we find Alexander of Tralles recommending the following prescription as a cure and prophylactic measure for gout and arthritis:

> Cast a living torpedo into a metal receptacle, add a quantity of oil and place the mixture in a kettle with water so that the oil will not burn or evaporate. Add to this a narcissus plant picked during the last quarter of the moon. Once it is mixed with the animal, cook the whole until it is dissolved and the bones are bare. All these operations must take place in the period of the decline of the moon. Use the oil to anoint the patient three times a day. If the patient is suffering joint pains the treatment will cure him, if he is free from pain then it will preserve him from future suffering. These anointings should be given for three days while the moon is in complete decline, for they would not be successful at any other time.[87]

The astrology incorporated in Alexander's recipe is of exotic origin, but the oil extract is strictly in line with Galenic tenets. Despite the approbation accorded Galen by his admirers, praise which he undoubtedly deserves, he was by no means completely free of the irrational simples of ancient Roman medical lore. Nor was he innocent of the barbaric practice

[84] Kühn, XII, 365.

[85] Kühn, VII, 108-109; Compare Sextus Empiricus (*Pyrrhonic Sketches*, XIV, line 38) who says that the torpedo produces no effect when applied to the body but causes numbness when applied to the extremities.

[86] *Loc. cit.* A similar description of the torpedo's action on the nerves is given in the *Syriac Book of Medicine*, trans. E. Wallis Budge, Oxford Press, 1913, vol. 2, p. 123, a work which is considered by some to have been largely copied from Galen.

[87] *Oeuvres*, ed. F. Brunet, Paris, 1937, IV, p. 261.

of cooking living animals in oil for the purpose of extracting certain inherent properties peculiar to them. For example, the oil in which a fox has been boiled alive he prescribes as an aid to digestion.[88] But while recipes of this kind are relatively uncommon in Galen they are, in the hands of the Byzantine physicians the principal instruments of therapeutics.

As far as can be ascertained, the torpedo oil remedy for gout as listed by Alexander of Tralles and Paul of Aegina [89] was the last original recipe to be concocted from electric fish by physicians of the western world.[90] In the East however many other medicinal virtues were discovered in these creatures. Indian physicians for example, employed them in all diseases characterized by excessive heat,[91] and Ibn-Sidah, a Muslim doctor of the eleventh century, believed a live electric catfish to have beneficial effects when placed on the brow of a person suffering an epileptic fit.[92]

Medical Uses for Electric Fish in Modern Times

Many primitive African tribes still employ the shock of the *Malopterurus electricus* as a medicinal agent, a practice which is probably of very ancient origin and may perhaps date from the time of the early Greek and Roman invasions of North Africa. A sixteenth century Jesuit missionary gives the following report of electroichthyic therapeutics as practised by the Abyssinians of that period: "In these Rivers and Lakes is also found the Torpedo (he is referring to the electric catfish), which if any man holds it in his hand, if it stirre not, it doth produce no effect; but if it move itself ever so little, it so tormenteth him which holds it, that his Arteries, Joints, Sinews and all his Members feel exceeding paine with a certain numbnesse; and as soon as it is let go out of the hand all the paine and numbness is also gone. The superstitious *Abassines* believe that it is good to expel Devils out of the human body, as it did torment Spirits no less than men." [93] A similar report is given by a seventeenth century traveller in that country: "The Habessines cure Quartan and Tertian Agues with it," he writes, "the manner thus: The patient is first to be bound hard to a table, after which the fish being applied to his joints, causeth a most cruel pain over all his members which being done the fit never returns

[88] Kühn, XII, 367.

[89] *Epitome*, VIII, 3.

[90] Jean Fernel (*Universa medicina* 1577, VI, p. 107) gives the torpedo oil recipe under the heading "Narcotica" but does not suggest any new applications for the remedy.

[91] Ad-Damiri (c. 1370), *Hayat-al-Hayawan, op. cit.*, p. 69.

[92] Cited by Ad-Damiri, *loc. cit.*

[93] Purchas, Samuel. *Hakluytus posthumus; or, Purchas his pilgrimes.* Glasgow, 1905-07, IX, p. 227.

again. A severe medicine which perhaps would not be unprofitable to those that are troubled with gout . . . Those Ethiopiens would certainly believe it who affirm that the virtue of the fish will dispossess a man of the devil himself." [94]

Another early missionary to Abyssinia describes a fish, evidently the *Malopterurus electricus* which he relates, " is of such a nature that no man can take it in his hand while it is alive, for it filleth the arm with paine as if every joint would go asunder." The natives, he says, believe that the skin of this fish " roasted and ground to powder and drunke in wine is medicinal against the Cholick." [95] The electrical subcutaneous tissue is still employed in Kaffir pharmacy. Alleviation of all respiratory diseases is supposed to result from the inhalation of the fumes arising from the dried tissue as it is roasted on a charcoal fire.[96] Other recent reports of the electric catfish being employed by African tribes for its supposed therapeutic properties are on record, and late in the last century several letters were published in the *Edinburgh Philosophical Journal* [97] describing how the natives of Nigeria were in the habit of exposing their children to the shock of the malopterurus in the belief that they would be strengthened by the discharge.

Instances of Europeans using electric fish as medical shocking machines are to be found in the literature up to about 1850. Artificially generated electricity had begun to find favor with European physicians by the middle of the eighteenth century. The invention of the Leyden jar in 1745 permitted the use of far stronger shocks than the older static machines had been able to deliver, and " called attention in a most dramatic manner to the effect of electricity on the human body." [98] Between the years 1750 and 1780 no less than twenty-six papers dealing with medical electricity appeared in the *Journal de Médecine* alone.[99] An electric shock machine was installed in the Middlesex Hospital in 1767, and within the next decade many other hospitals followed suit. Almost immediately after the invention of the Leyden jar the similarity between the shock it delivered and the discharge of the electric fish was pointed out [100] and physicians were quick to test the remedial properties of the fish; apparently living shocking machines more powerful than the man-made instruments.

[94] Hiob, Ludolf, *A new history of Ethiopia*, 1682, Bk. I, Ch. XI, p. 62.
[95] Purchas, *loc. cit.*, V, p. 405.
[96] Mitchell, J. C., *Report on the edible fishes of Lake Menzaleh*. Cairo, 1895, p. 14.
[97] 1854, *2*, 379; and 1857, *5*, 267-287.
[98] Hoff, H. E., The Pre-Galvanian Electrophysiologists, *Annals of Science*, 1936, *1*, 161.
[99] *Ibid.*, p. 163.
[100] See for example; Turner, Robert, *Electricology*, Worcester, 1746.

The first report of such experiments is to be found in a letter written by Storm van s'Gravesande, Governor of Surinam, to the Dutch physicist Allamand, dated November 22, 1754: "it has been observed," he writes, "that various people who to some degree had gouty pains, and who touched the torpedo had been completely cured two or three minutes after contact. The experiment has been repeated at various times but always with the same result." [101] A similar but more complete account is given by a surgeon, one Frans van der Lott in a letter dated Rio Essequebo, June 7, 1761.[102]

Some chickens had cramps in the tendons of their feet so that their claws were drawn together in such a way that they could not walk, and they died from it. I then held (he says) one chicken by the wings and placed its feet on the back of a *Conger-aal* [103] (i. e. Gymnotus) which was lying in a tub of water. The chicken was so shocked by this that it started to screech terribly: after the procedure was repeated a second time the chicken was recovered, and when the other chickens were treated in this manner no more of them died.

An Indian (he continues) had a paralysis of the abdomen. After having used several external and internal medicines in vain, I put, in the presence of various of my friends a *Conger-aal* which had just been caught in the river and hence was in full strength, against both knees of the above mentioned patient. The shock was so tremendous that two persons who were holding the patient under the arms on each side were knocked to the floor. After I had repeated this three times, the patient who had had to be carried from the plantation where he was, walked back to the plantation without cane or crutches, completely recovered, and without need of any other assistance.

Mr. Abraham van Doorn ex-councillor of the same colony had a negro boy among his slaves whose estimated age was eight or nine years. He was afflicted by an obstruction in his nerves in such a way that his arms and legs were drawn crooked. This gentleman threw the boy daily into a tub of water in which there was a large *Conger-aal* of the black variety. The boy was so greatly shocked by this that he crawled out on his hands and knees, but sometimes he was unable to do this, and he had to be helped, however the helper then received a portion of the shock. The result was that the boy recovered completely from the nerve disease but the malformation of the shin-bone which was connected with it nevertheless remained.

The gentleman referred to (the writer says) has also made the following two experiments. He threw a slave boy who had fever badly, similarly into a tub with

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[101] Allamand, J. N. S., Kort verhaal van de uitwerkzelen, welke een Americanse vis veroorsaakt op de geenen die hem aanraaken. *Verh. Holl. Maatsch. Weten. Haarlem.* 1756, *2*, 372-379.

[102] Lott, Frans van der, Kort bericht van den conger-aal, afte drilvisch. *Verh. Holl. Maatsch. Weten. Haarlem*, 1762, 6, pt. 2, 87-93.

[103] Other early authors refer to the gymnotus as a Conger-eel; see for example Du Hamel. *Hist. Acad. Sci. Paris* 1666-1699, VII, 7.

a *Conger-aal.* The boy was so strongly shocked that this gentleman was forced to help him out again, but several minutes later the fever had disappeared and did not return again. The second experiment was with an Indian boy who having the fever very badly while travelling, had himself shocked by a *Conger-aal*, the result being the same as in the previous case.

The gentleman also says (continues the writer) that when his slaves complain of a bad headache, he puts one of their hands on their head and with the other they touch the fish, and immediately, without it having failed once they are cured.

Strange as it may seem, these heroic remedies were much favored by the Indian and negroes [104] and they continued to use them until comparatively recent times. For many years the colonists of Berbice and Demerara made it a practice to keep two or three living gymnoti in a tank for the use of their plantation workers "who had great faith in the power of the fish's shock to cure rheumatic and paralytic affections." [105] The negroes especially, believed in these treatments which, incidentally, they combined with applications of boa-constrictor fat. Nor were they alone in their faith for there are instances on record of European doctors in Guiana using the shocks to treat rheumatism as late as 1850.

Toward the end of the 18th and during the first part of the 19th century many specimens of *Gymnotus electricus* were exhibited in Europe. Due to the current popularity of electro-therapeusis, or Franklinism as it was then called, many people suffering from gout, rheumatism, and similar diseases flocked to try the curative power of the "natural" electricity discharged by the fish,[106] and an advertisement published in London in 1777 invites one and all to come and be shocked by a "torporific eel" at two shillings and sixpence a time.[107]

Although clinical medicine has long since ceased to investigate the therapeutic properties of electric fish these creatures are once again being called to the service of medical science. For some time it has been known that their electric discharges are analagous to the potentials which arise in nerve and muscle tissue during activity. Investigators [108] are therefore

[104] Humboldt (*Personal Narrative*, Vol. 11, p. 119) seems to be of the opinion that these practices were of native origin but it is apparent from the foregoing letters that they were introduced by Europeans.

[105] Wilson, George. On the employment of the electrical eel, Gymnotus electricus, as a medical shock machine by the natives of Surinam. *Rept. Brit. Assoc. Adv. Sci.* 1859-60, 158-159.

[106] See e. g. Fahlberg, Samuel, Beskrifning öfver elektriska alen (Gymnotus electricus). *Handl. K. Vetensk. Akad.* 1801, 22, 122-156.

[107] Strong, Adam (pseud.), *The electrical eel, or Gymnotus electricus by A. S. Naturalist*, London, 1777.

[108] See e. g. Nachmansohn et al., *J. Neurophysiol.* 1942, *5*, 499-516; 1943; *6*, 383-396,

turning again to the study of electric fish in the hope that they might thereby elucidate the processes by which bioelectric potentials are generated not only in the electric organs but in all tissues where they occur. If and when such knowledge is obtained, the clinical physician will be provided with a greater understanding of the electrical patterns recorded by such instruments as the electroencephalograph, and will be able thereby to extend the applications and value of both electrodiagnosis and electrotherapy.

ACKNOWLEDGMENT

It is a pleasure to acknowledge the assistance given me by Dr. W. W. Francis with the translation of many of the references, and to take this opportunity of expressing my appreciation of the help he and Dr. H. E. Hoff have given me in the preparation of this essay.

and Baldwin, *Biochemical J.* 1938, *32*, 5. This is not to suggest that the investigation of the mechanisms underlying the production of the electric discharge has only recently been initiated. On the contrary the bibliography of the subject reads like a name-list of the great thinkers of all sciences and of all ages. Indeed the history of electroichthyology constitutes a vivid commentary on the evolution of scientific method. A paper now in process of preparation will cover the scientific history of electric fish from the Middle Ages to the present day.

SYMPOSIUM ON BENJAMIN RUSH

BENJAMIN RUSH: A PHYSICIAN AS SEEN IN HIS LETTERS*

L. H. BUTTERFIELD

Toward the end of May 1943 there opened at the best-known auction house in New York a remarkable sale of American historical manuscripts. This was the sale of the Alexander Biddle Papers, and it required sessions distributed over six evenings to disperse a mass of papers among which there was probably not a single item that had ever been through a dealer's hands before. This was one of the exciting things about the sale: it was all fresh material and there was a great deal of it. But what proved more exciting was the quality of the material from historical and literary standpoints. Biddles had been prominent for generations in public life and had been friends of Washington and other great men in Revolutionary and early national America. More important, Alexander Biddle had married Julia Wilmer Rush, who brought with her a large segment of the papers of her grandfather, Dr. Benjamin Rush. Some 400 lots in the sale consisted of letters to Rush from such friends as John, Abigail, and John Quincy Adams, John Dickinson, Benjamin Franklin, Horatio Gates, Nathanael Greene, John Jay, Thomas Jefferson, Thaddeus Kosciuszko, Charles Lee, James Madison, James Monroe, Thomas Paine, David Rittenhouse, Anthony Wayne, and John Witherspoon. The letters of all those named have always, for good reasons, been eagerly sought by collectors and institutions, and the bidding for them was, as a satisfied auctioneer would say, very spirited. As for the doctor himself, his autographs have not usually brought high prices, for signatures of his are commonly met with on bills and prescriptions up and down the land, and there has been such a scarcity of biographical material about him that few have known his share in our early history as a nation. By the time his letters came up in

* The collecting and editing of Benjamin Rush's letters for a forthcoming edition have been made possible by a grant from the American Philosophical Society. The edition will be a select one, but in conjunction with it a union catalogue of *all* letters to, by, and pertaining to Rush and of all manuscripts and publications by and about him is to be established in the Library of the Society. Since a large portion of Rush's correspondence has not yet come to light and the catalogue aims at completeness, the author of the present article will welcome information about Rush letters or other documents that may have escaped his search, especially those in private hands, in smaller American libraries, and in foreign libraries. Information may be addressed to him at the Princeton University Library, Princeton, N. J.

the Biddle Sale, however, at least the buyers and bystanders were impressed with his stature, if for no other reason than that he had so many distinguished correspondents. The first among the approximately 125 Rush letters in the sale went for $100 or more apiece, some later ones went for $200 or more, and two of them—I am sorry to say they describe quarrels with other physicians—sold for over $300.

After some study of the matter, I am prepared to say they were worth the prices paid. Rush was a great letter-writer in an age of great letter-writers. In the eighteenth century, when you wrote a letter, you were obliged to say something that would be worth not only your addressee's time but also the postage—not as cheap then as now—that ordinarily he had to pay. And there existed at that time, especially on this side of the Atlantic, a mood of confident optimism that stimulated men to exchange ideas as well as news by post. The bulk of the writing done by Franklin, Jefferson, and John Adams—and much of their best writing—was in letters. So it may prove with Rush, despite the long list of his publications in pamphlet and book form. There is no good way of estimating his total epistolary output, but it was large, prodigious even, if we keep in mind that he wrote all his own letters, never took vacations, and continued his teaching and practice to the time of his death.[1]

* * * * *

Part of the excellence of Rush's letters is of course owing to his unusual opportunities to observe great men and events at close range. Pre-Revolutionary Philadelphia, where he grew up and served his apprenticeship, was a cultural nerve-center of the British Empire. From there he went to spend two years in the Edinburgh of Hume, Robertson, and Cullen; from there to London, where Franklin, Lettsom, and other eminent men befriended him; and at length back to Philadelphia to teach chemistry at the College and build a practice. An early and ardent Whig, Rush rode out to meet the Massachusetts delegates to the first Continental Congress in 1774 and eventually came to know most of the distinguished men in that body, of which he was himself a member in 1776-77. For a year and a half, during the most difficult period of the war, he served in the field, and though he disagreed on important points with the commander-in-chief, he remained on excellent terms with such trusted subordinates of Washington as Wayne, Greene, and McHenry. When the delegates to

[1] For a survey of Rush letters so far located, see my "Report of Progress" in The American Philosophical Society, *Year Book* for 1945; in the press.

the Federal Convention gathered in Philadelphia, he made new friends and learned what he could from his old ones about the secret proceedings of the sessions. Under the new Constitution the government returned to Philadelphia, thanks in part to Rush's efforts. Though he had retired from political activities and was a very busy physician, he kept his finger on the public pulse as well by seeing as much as he could of his old friends of 1776. By now a figure of national eminence, Rush was sought for advice on all manner of subjects, including the proper mode of training children in the home and the origin of prehistoric mounds in Ohio, military plans for Miranda's expedition to free Spanish colonies in South America and medical preparation for the Northwestern expedition of Lewis and Clark, the curriculum at Princeton and the organization of the Universalist Church in the United States, veterinary science and the religious opinions of Tom Paine, how to cultivate the sugar maple and how a young woman should comport herself who has married a widower with five children. On these, and indeed on almost any subject, he was always ready to give opinions. In variety of substance Rush's letters can hardly be surpassed.

Rush not only had unusual opportunities but assiduously improved them. From youth to death he followed the principles he stated in a lecture of 1809 "On the Means of Acquiring Knowledge." The means were "OBSERVATION, READING, THINKING, EXPERIMENTING, RECORDING, CONVERSING and lastly COMPOSING."[2] David Ramsay observed, without playfulness, that it was "a singular opinion of [Rush's], but in unison with his medical system, 'that ideas whether acquired from books or by reflection, produced a plethora in the mind, which can only be relieved by depletion from the pen or tongue.'"[3] How he wrote all that he did is explained by the regimen which Rush describes in his autobiographical memoir and which contains many hints for the sluggards among us. He answered letters, for example, while eating; after 1789 he rarely dined out or visited in the evening; he wrote instead of read when he was sleepy or when the weather was warm; and he "derived *rest* from fatigue in reading by writing; and from writing by reading, so as to require no other relaxation of body or mind for many hours."[4] In answer to a query put to him in the last year of his life regarding his habits and health, Rush wrote that, despite a pulmonary condition that lasted from his eighteenth to his

[2] Rush, *Sixteen Introductory Lectures to Courses of Lectures upon the Institutes and Practice of Medicine*, Philadelphia, 1811, p. 341.

[3] *An Eulogium upon Benjamin Rush, M. D.*, Philadelphia, 1813, p. 97.

[4] L. A. Biddle, ed., *A Memorial Containing Travels through Life or Sundry Incidents in the Life of Benjamin Rush*, Philadelphia, 1905, pp. 65-6.

fortieth year, he now took no special precautions aside from eating little animal food, slept seven hours a night, spent three to seven hours at his desk, and though now in his sixty-eighth year possessed "the same facility in doing business, and the same pleasure in study, that I did when I was a young man." [5]

Letter-writing was a favorite occupation. In repeated injunctions to his students and his sons, Rush makes clear his own standards in this art. He chides his son James at Princeton for poor spelling, for dividing words in the middle of a syllable, for a too florid signature. "'Ex simplicitate decus,'" he observes, "should govern our most trifling compositions." [6] It did Rush's, for he wrote a bold, plain hand. Earlier he told James: "Never write in a hurry. Even a common note upon the most common business should be written, as if it were one day to be read in a Court, or published in a newspaper." [7]

Rush himself usually followed this principle, but not always. In earlier days, in the heat of his battles with various evils and evil men, he had expressed opinions, especially about the evil men, which he would not have wanted to appear in either a newspaper or a court. I refrain from quoting examples. Yet this indiscreetness is a trait that made his correspondents relish his letters then and that makes them agreeable reading now. It seems to have been early notorious. Abigail Adams reported to Mercy Warren on 8 January 1781:

> I saw by the last pensilvania paper under York News, that they [the British] had got a Letter of Dr. Rush's which they have promissed to print in the Next paper in which say they, he treats the Rebel Senate with great freedom. that both you and I can believe, from former Specimens. Rush will care as little as any body.[8]

Not as agreeable a trait of character, but one which pervaded much that Rush did and wrote, was an invincible sense of rectitude. His early Calvinistic training had bred into him the conviction that there were only two sides to a question—the right and the wrong—and therefore that all who opposed Dr. Rush's reasoned conclusions were agents of the devil. "Our cause is the cause of Virtue & heaven," he wrote in 1783 regarding his efforts to overthrow the Pennsylvania Constitution of 1776, and the coming peace will reduce "the fools, knaves, & bankrupts of the State to

[5] To Dr. Vine Utley, 25 June 1812; Massachusetts Historical Society, Jefferson Papers. (This copy of Rush's letter was enclosed in a letter by Utley to Jefferson asking similar questions.)

[6] 22 June 1803; Library Company of Philadelphia, Ridgway Branch, Rush MSS.

[7] 25 May 1802; Libr. Co. Phila., Rush MSS.

[8] *Warren-Adams Letters* (Mass. Hist. Soc., *Collections*, vol. 71), II, 1925, p. 164.

their original insignificance." [9] It was always thus. Even when Rush changed sides, as he did on important political, religious, and medical questions, he "exerted himself," to use an early biographer's well-chosen words, "with a rational vehemence for the interests of whatever party he thought it his duty to espouse." [10]

In our erring world righteousness of this stern order is likely to win for a man more foes than friends. In his long and strenuous career Rush made more enemies than he probably deserved, and he schooled himself never to be deflected by opposition from a course he had set. Writing in 1789 about the abuse he had suffered when first working for the emancipation of slaves in Pennsylvania, Rush told Noah Webster that the truly good man will earn only unpopularity on this side of the grave. "*Expect* to be persecuted for doing good; & *Learn* to rejoice in persecution." [11] Remarks of this kind are fairly frequently found in the letters and are symptoms of a mild paranoia which developed early in his personality. One of Rush's most intimate early friends was the Rev. Thomas Coombe, who was in London during Rush's visit there and who stayed on and wrote a series of charming letters to Rush in Philadelphia. We lack the other side of the correspondence, but Coombe repeatedly enjoined his friend not to "be disheartened at the Insincerity of human Friendships" and to look to Providence for support against the attacks of his "enemies." [12] In the autobiographical letters Rush wrote in his later years he gives imposing lists of his persecutors. "I thank God," he once burst out to John Adams,

> my destiny in the world of Spirits to which I am hastening is not to be determined by Slaveholders, Old tories, latin and Greek Schoolmasters,—Judges who defend capital punishments, Philadelphia physicians—persecuting Clergymen, nor yet by General Washington, ALL of whom I have offended *only* by attempting to lessen the misery and ignorance of my fellow men.[13]

* * * * *

Of Rush's education for the practice of medicine his letters tell us, if not enough, at least something. The earliest surviving letter was written during his first year of apprenticeship under Dr. Redman and reveals a young man painfully earnest and a little regretful that he had not chosen theology rather than medicine:

[9] To John Montgomery, 14 April 1783; Libr. Co. Phila., Rush MSS.
[10] John Sanderson, *Biography of the Signers to the Declaration of Independance*, Philadelphia, 1823-7, IV, 279-80.
[11] 29 Dec. 1789; New York Public Library, Webster Papers.
[12] Coombe to Rush, 20 July 1769, 12 March 1770; Libr. Co. Phila., Rush MSS.
[13] 12 Feb. 1812; Libr. Co. Phila., Rush MSS.

Now how inglorious must This Study [Physic] appear when set in Competition with Divinity, the One employed in advancing temporal Happiness the other eternal,—One applying Remedies to a fading, mortal Body—the other employed in healing the Sickness of a Soul: immortal and everlasting.[14]

He also expressed fears of the temptations to youth encountered in a big city—though he was writing from Quaker Philadelphia in 1761. In the next year he began a regular correspondence with his fellow-Princetonian Ebenezer Hazard, in New York; and it is reassuring to find from allusions there that Rush was kept too busy in Redman's shop to indulge in any form of dissipation. From an important letter of 1765 announcing the return of Dr. John Morgan from Europe, it is clear that Rush's professional ambition was fired by Morgan's celebrity. In this letter Rush states his plan to study languages on his own before going to London for medical study. One of the languages is "Dutch" (that is, German), "in as much as so great a part of our City consists of that nation." He is also about to read the Greek Testament and Horace, "two Books that in my Opinion contain the Marrow of the Greek and latin Languages." Rush concluded with a characteristic injunction: "This my dear Ebenezer is our forming time . . . let us then be more diligent in preparing Ourselves to Serve our generation." [15]

For the years of study in Edinburgh and London there is a group of letters to Dr. Morgan and a scattering of letters to others. Rush wrote his teacher of his warm reception by Cullen and others to whom he carried letters from Morgan, and of their great interest in Morgan's Philadelphia venture. Since Morgan was temporarily filling the chair of chemistry at the new Philadelphia medical school so that it would be available to Rush on his return, it behooved the younger man to put his best foot forward in reporting his academic progress. This he did.[16]

In 1768 Rush went on to London for a winter's work in the hospitals and instruction in dissection. (Dissection was done only in cold weather.) He also made a short jaunt to Paris and brought back a conscientious sightseer's journal and a poor opinion of French medical science.

Rush's years of study abroad—the only extended period he ever spent away from Philadelphia—profoundly influenced his life and mind. A generation later, when James Rush followed his father's steps to Edin-

[14] To Enoch Green, 1761; Historical Society of Pennsylvania, Gratz Collection.
[15] 21 May 1765; Libr. Co. Phila., Rush MSS.
[16] The earliest letter to Morgan, 16 Nov. 1766, is in the Historical Society of Pennsylvania, Gratz Collection; several others from Europe are in the College of Physicians of Philadelphia.

burgh, Rush longed to relive his student years. "Perhaps there is at present no Spot upon the earth," he told James, "where Religion, Science and literature combine more to produce moral & intellectual pleasures than in the metropolis of Scotland." What a contrast, he went on, between the conversational gatherings at Mrs. Hogg's or Mrs. Fletcher's "and the convivial dinners, and insipid teaparties of Philada!" [17] But in 1768, stirred by the vague but strong emotion that was to crystallize in Revolutionary patriotism, he had written from Edinburgh that he could scarcely bear not to return home soon: "O! Pensylvania can the World boast of such Happiness as thy Sons enjoy?—I think any native of Philada: shd: be sent Abroad for a few years if it was Only to teach him to prize his native Country above all Places in the World." [18]

Back home by the summer of 1769, Rush was caught up in a whirl of activity. He had to establish a practice, but this seems to have been a mere byproduct of his exertions in teaching chemistry, reading papers to the Philosophical Society, and writing abolitionist tracts and political communications, under various signatures, to the newspapers. The newspaper pieces brought him to the notice of political leaders in the colony and led to further patriotic activities. He encouraged Paine in the composition of *Common Sense,* found a publisher for it, and approved its argument. At the beginning of 1776, just as this pamphlet burst upon the country, Rush went to Princeton to marry a young lady named Julia Stockton. According to his own statement, he had been deeply impressed by her observing, the day after he had met her, that Dr. Witherspoon "was the best preacher she had ever heard." [19] Rush had persuaded Dr. Witherspoon to come to Princeton from Scotland eight years before, so that Julia's judgment was not a little flattering. The letters between husband and wife during their first years of marriage wonderfully mingle love, medicine, politics, and war. A single fine example must suffice.

Tuesday night.

My dearest Jewel/

I am happy in finding that my appointment in Congress gives you so much pleasure. I beleive it has operated in the manner You expected upon some of my *Old* friends. I spoke for the first time this day About ten minutes upon a question that proved successful. I felt that I was not thundering like Cato in the Uttica of our committee of inspection. The Audience is truly respectable. Dr Franklin alone is en'o to confound with his presence a thousand such men as myself.—I hope

[17] 19 March 1810; Libr. Co., Phila., Rush MSS.
[18] To Samuel Fisher, 28 July 1768; Yale University Library, Franklin Collection.
[19] Biddle, *A Memorial*, pp. 85-6.

however in a little time to experience the same freedom & confidence in speaking that I observe in other members. I find even our illustrious body is marked with features of human nature. We can talk Nonsense now & then as well as our neighbours. This reconciles me to myself.—

I wish you would return with your Papa the latter end of this, or the beginning of next week. I cannot support the burden of public & private business which now lays upon my Shoulders without you. You shall go to Morven Again with your Papa when he goes to take charge of the govermt: of New Jersey an event which all parties say is inevitable. Think my love how long our house must be left without a head in my necessary attendance upon Congress. Wm fell asleep as usual this evening—Betsey walked out—& I was obliged to wait near an hour before I could go out to visit a patient—and at last got one of the neighbours to watch the door. My business suffers from the want of you. My prentices are young, & Betsey too much out of the way to give answers. Do come home as soon as possible, or I tremble at the consequences. I languish for want of company. All our neighbours & friends you know are in the country or the camp.—I shall execute all your commissions. God bless you! How I long to tell you how much I love you.—

I shall have a regiment of prentices, having had an application this day from a lad in the Jerseys—but the Jews house in the Alley will make an excellent barrack for them. I am pleased with taking Johney Pintard into the house. I suppose you told him the fee was 100 guineas. This sum with what we have by us, & what I expect soon to receive will enable us to realize our money in a house, or a plantation. It is impossible now to put money out to interest. Heaven requires only the heart. I was *willing* to be poor, that my country might be free. The latter I hope will be granted, and contrary even to my wishes I find I am growing rich. My attendance in Congress has not hurt my business having as much to do as ever.—My wages in Congress are 20/ per day. Good night my charming girl—I shall close my letter in the morning.—

Wednesday morning—Have just read in the paper a list of the committee of Safety. A majority of them are *good* men—Cannon & Matlack are among them.!!!—

Much love to every body—Mama must part with you. The condition of this Obligation remember is that you are to pay another visit for a week, or two next month.—Yours my dearest—

BRush

PS no letter from James
since he went away— [20]

In order to deal at all adequately with Rush as a physician, it will be necessary to break off this chronological survey and wholly to omit important and interesting aspects of his career. Rush's role in the Revo-

[20] Undated, but probably 30 July 1776, the first Tuesday following Rush's taking his seat. Yale Univ. Libr., Franklin Collection.

lution will not be entered into. The letters throw some needed light on it, but it deserves a monograph. His medical "system," or theory of the unity of disease, is a high and esoteric matter which I must leave to the learned. His pioneer work as a psychiatrist is currently receiving adequate attention and is therefore passed over. So too are his extensive and influential political activities and his educational and scientific contributions. Most of all I regret having to deal only passingly with the long series of humanitarian crusades that exhibit so well his moral outlook and physical stamina. "The physician who loves the whole human race," he once told a class, "will always be actuated with more zeal to extend the usefulness of his profession, than the physician whose affections are confined to the limited circle of his habitual patients." [21] Writing John Montgomery in 1785, Rush informed him that Mr. Hall the printer would shortly send on "a new pamphflet written by that turbulent Spirit Dr Rush who I hope will never be quiet while there is ignorance—Slavery or misery in Pennsylvania." [22] During the late 80's and early 90's, stimulated by the rising impulse toward national union, Rush lashed himself into a perfect frenzy of activity to improve his city, his country, and his kind. He bombarded his correspondents with pamphlets attacking strong drink, slavery, war, capital punishment, tobacco, oaths, and country fairs, and advocating beer and cider, the study of science rather than Latin and Greek in schools, education for women, a federal university, churches for Negroes, and the cultivation of the sugar maple. He told the Rev. Jeremy Belknap that frequent returns of his pulmonary disorder had "quickened my industry in completing my Quota of services to my fellow creatures. . . . Perhaps by some of these works, it may please God to prolong my usefulness after I depart hence & am no more." [23] He urged Belknap to join him in all these crusades, but Belknap, who was a humanitarian of a less impetuous, Congregational breed, was first a little stunned and then a little skeptical. Yet his praise was perfectly sincere when he wrote Rush: "Dear Doctor I can compare you to nothing better than *Mr Great Heart* in Bunyan who attacks without mercy all the Giants, Hydras, Hobgoblins &c. which stand in the way of his Pilgrims & conducts them thro' all opposition to the celestial City." [24]

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[21] *Sixteen Introductory Lectures*, pp. 295-6.
[22] 14 Jan. 1785; Libr. Co., Phila., Rush MSS.
[23] 2 March 1791; Mass. Hist. Soc., Belknap Papers.
[24] 7 Oct. 1790; Libr. Co. Phila., Rush MSS.

Our view of Rush as a practitioner may well begin with a short account, written by himself, of a day's work in 1791:

Philada 15th Augst: 1791

My dear Julia/

It was One of Dr Finley's consolations in his last illness "that he was *ashamed* to take rest here."—I hope I shall be able in my last moments to derive comfort from the same reflection. I am a Stranger to what the World calls rest.—I wish only to be more & more ashamed of what I conceive to be *idleness*.—This morning at 3 oClock I was called to see Mrs Conyngham in the country. I returned at Seven and was on my feet 'till one. At 3 tired nature sunk—and I was obliged to go to bed. At 6 I arose, and have been busy 'till 9.—Thank God—I feel perfectly well—and in good Spirits.—

Uncle Samey lodged with us last night. I have not seen him since breakfast.—

A sudden call to visit a dying patient obliges me to conclude.

BRush [25]

In addition to a home practice that could hardly have been as strenuous as this every day, Rush in later life conducted an increasingly large part of his practice by mail. A huge mass of material for the study of mail-order methods in doctoring exists in the Rush Papers at the Library Company of Philadelphia, and it ought to be quarried. Sometimes the patients themselves describe their symptoms; often their fathers, sons, brothers, wives and husbands write; friends write for friends; scores of former pupils continue for years to ask for help; and physicians from Vermont to Georgia and far into the new West lay their difficult cases before Rush. The burden of answering these hundreds of appeals would have been insupportable to a man of ordinary capacities; but Rush appears to have responded with care and promptness. Occasionally he complained of the postage he had to pay in receiving these letters; and at one point he worked out a sort of form letter to be sent sometimes to persons who failed to enclose a fee. The following draft letter is interesting for the passage, within brackets, which Rush on second thought crossed out:

Sir/

So much of my time has lately been taken up in answering letters for advice for which I have received no compensation, and for which I am obliged to pay the postage, that I have been compelled to resolve to reply to no letter for advice which is not accompanied with a fee, Unless it comes from persons who acknowledge themselves to be poor. You will not I hope complain of this Conduct when I add [that I am not rich—that my business in Philadelphia has been nearly ruined by the public and private persecutions to which my principles & practice in medicine

[25] 15 Aug. 1791; Boston Public Library.

have exposed me—that I have a large family, and that I do not think it just to work for nothing for those who are able to pay for my services. While I mention my obligations to my family, I must add that I do not suffer them to interfere with my duties to the poor. They share a part of all my earnings.] that should you think it worth while to write to me a second time upon the Subject of your health and enclose ten Dollars in your letter, it shall be given in charity to the Pennsylvania hospital,—and the history of your case shall be faithfully & minutely attended to by Sir

Yours &c most Obed Servant

Benjn Rush

Philada Decr 29. 1798 [26]

A memorandum on the back of the document indicates that the fee was sent to Rush and transmitted to the Hospital.

Not as many of the recipients' copies of Rush's letters to patients have been recovered as one would like to have, but there are enough to illustrate the heroic nature of his cures. Only a few notes on these can be given here. To a judge whose wife had a pulmonary disorder he said he did not despair of her recovery, "provided she immediately begins to use the only remedy that is radical in complaints of the breast—I mean *riding on horseback*. Take her with you to all your Courts. The more she roughs it on these journeys, the better." [27] Writing Mrs. Richard Caton, whose daughter was ill with a cold, he advised that the girl stay constantly in "a close stove room" kept at summer temperature day and night, and that "she should use constant exercise, particularly playing Battle door and jumping the rope." [28] A patient named Edward Harris, whose affliction we can only guess at, Rush advised to

mix two ounces of Iron filings, with the same quantity of common Salt, and take a teaspoonful of it every morning in molasses or Syrup fasting as before directed. Should that dose be offensive to your Stomach take less; if it be not offensive to your Stomach take a larger dose of it." [29]

In the most interesting of these letters Rush goes beyond professional advice and assumes the character of religious or psychiatric adviser. A great deal of contemporary testimony suggests that, strictly as a practitioner, Rush was most successful in this particular way: a man of great force of character, he inspired his patients to recover. Though the medical

[26] To Richard Bushe, Jr.; Libr. Co. Phila., Rush MSS.

[27] To an unidentified correspondent, 14 March 1793; printed in a sale catalogue of Thomas F. Madigan, 1935 (clipping in New York Pub. Libr., Manuscript Room).

[28] 5 Nov. 1812; printed in Anderson Auction Co., Catalogue 1119, lot 239 (8 Jan. 1915).

[29] 11 July 1812; University of Pennsylvania Library, Miscellaneous MSS.

scientist may view this kind of ability patronizingly, it is not a mean one, and in a family physician it is of the utmost value. A typical letter of Rush's in this vein is that to his fellow practitioner David R. Patteson of Virginia, dated 19 June 1809. Rush reports that he has procured a preparation for Patteson's pulmonary disease and states the dosage; but at the same time he recommends a continued reliance on the powers of his Maker.[30] The letter bears out precisely assertions made by an anonymous eulogist of Rush in 1813:

> Formed to the sick a kind relief to give,
> His bold prescriptions taught them how to live;
> When death looked ghastly from the fading eye,
> His pious precepts taught them how to die![31]

A second example is the revealing series of letters Rush wrote to Walter Stone, brother of Thomas Stone, the Signer from Maryland. In the earliest, dated 5 January 1791, Rush told Stone that "after maturely considering your case, I am disposed to believe it to be the Hippocondriac disorder." He advised "a total abstraction from business of all sorts," a pleasure trip to Philadelphia for the social season, a heavy diet, wines, and the desirability of abdominal massages and keeping his feet warm.

> The above prescriptions [he went on] will be more or less effectual according as they are assisted or not, by the society of the ladies. The company of one of them for life, I am satisfied would do more towards restoring you to perfect health, than all the other remedies that have ever been prescribed for you.[32]

Evidently Stone was not quite pleased with Rush's diagnosis, for in his next Rush explains that some of his information about his patient came from Stone's brother, and further that he by no means meant to imply that Stone's malady is "imaginary." On the contrary, it is as bodily a one "as pleurisy or the Gout," but it is probably aggravated by solitude and want of care. Thus the advice to marry. Stone need not fear making his wife a nurse, "for your disorder is seldom met with in married life." The letter then descends to the more prosaic subject of how Stone may cure his worms.[33]

The history of Rush's relations with his fellow physicians and faculty members contains a number of unedifying chapters. That he was easily stirred to anger and that he nursed grudges are facts substantiated by a

[30] Photostat in the Virginia State Library.
[31] *Elegiac Poem, on the Death of Dr. Benjamin Rush*, Philadelphia, 1813, p. 18.
[32] Library of Congress, Stone Papers.
[33] 30 Jan. 1791; *ibid.*

great many documents bearing on his professional quarrels among the papers bequeathed to his son James and duly deposited by him in the Ridgway Library. Let it be remembered that Rush was not unusual for his time in being a quarrelsome physician. There were bitter feuds among the medical authorities at Boston, Louisville, and Cincinnati as well as at Philadelphia. Before the rise of laboratory pathology such clashes between personalities were of course inevitable. "Doctors could support their methods only by boasting of their cures; naturally each clique tried to magnify its own and depreciate its opponents' triumphs." [84] The situation in medical theory then was somewhat analagous to that in educational or economic theory today. At one time or another during his forty-four years of service as a teacher of medicine, Rush conducted public controversies with virtually every one of his colleagues who achieved a professional reputation. At times the medical school must have seemed more like an armed camp than a hall of learning. Dr. Benjamin Barton has been elected professor of materia medica, Rush writes to Dr. John R. Coxe in London. Dr. Shippen was his advocate: "I consider him as a recruit to the enemies of the new [i. e. Rush's] System of medicine, & that he will be supported in proportion as he barks at me." [85] It is little wonder that Rush warned his son James, then studying at Edinburgh: "Expect and prepare yourself for enemies." [86] When James wrote that even the learned professors at Edinburgh disagreed, Rush replied that a former professor of his "used to say 'that nothing could exceed the malice of rival authors, except the rancour of rival physicians.' The history of my life would furnish a melancholy proof of this remark." [87]

This admission in itself shows a certain detachment, almost a mellowing, on Rush's part in his last years. In 1812 he could write to Dr. Maxwell McDowell of Baltimore:

> My best wishes attend your medical School!—I am not acquainted with Dr: Davage, but I have heard that he is determined to prostrate the new doctrines in medicine, taught in the University of Pennsysa: Success to him!—if his opinions are more calculated to lessen the empire of pain and death than ours.[88]

In the same month he invited Dr. David Hosack of New York to attend a meeting of the Philosophical Society as his guest. Hosack had recently

[84] James Thomas Flexner, *Doctors on Horseback*, New York, 1937, pp. 210-211 (paraphrasing Daniel Drake).

[85] 28 April 1796; Hist. Soc. Penna., Dreer Collection.

[86] 30 Aug. 1810; Libr. Co. Phila., Rush MSS.

[87] 4 Oct. 1810; *ibid.*

[88] 11 June 1812; New York Pub. Libr., Miscellaneous Papers.

criticized in print certain medical opinions held by Rush. But with a magnanimity that would have made his life much happier if it had developed earlier, Rush said:

> Let us show the world that a difference upon medical subjects is not incompatible with medical friendships; and in so doing, let us throw the whole odium of the hostility of physicians to each other upon their competition for business and money. Alas! while merchants, mechanics, lawyers, and the clergy live in a friendly intercourse with each other, and while even the brutes are gregarious, and
>
> "Devil with devil firm concord holds,"
>
> to use the words of Milton, physicians, in all ages and countries, riot upon each other's characters. How shall we resolve this problem in morals?[39]

To a very considerable degree scientific medicine *has* resolved this problem.

Among his students and apprentices and among young doctors generally, Rush was always popular and often beloved. Charles Caldwell was doubtless right in asserting that Rush made special efforts to captivate promising young men in order to secure their loyalty and to propagate his system.[40] But this was not the whole truth. Rush genuinely loved young people. In his letters he speaks with almost uniform affection and praise of the young assistants who lived in his house. Toward them he felt he stood *in loco parentis*, and letters among the Rush Papers from members of their families recognize this relationship. Many of his former students continued to ask his counsel on medical and personal problems for years after they had left the University. There is ample evidence of his kindness to them in return: he advised them about further studies, sent them reading lists, arranged for the publication of their discoveries, and so on. The following letter to John Dorsey in London is perfectly representative of his manner and substance when addressing old students.

> Philadelphia May 23rd: 1804
>
> My dear young friend/
>
> Your agreeable and unexpected letter gave me great pleasure. I am glad to find you are so well employed. I hope you will bring home with you all the new opinions, and modes of practice in medicine and Surgery of the London physicians. Thier practice in fevers is probably perfectly correct, notwithstanding they do not use the lancet so liberally as your fathers in medicine. The luxurious or scanty diet, and the great excess which prevails among the citizens of London in labor and pleasure, all alike concur, to prevent that reaction in the System which renders

[39] 20 June 1812; Samuel Gross, ed., *Lives of Eminent American Physicians and Surgeons in the Nineteenth Century*, Philadelphia, 1861, pp. 314-15.

[40] *Autobiography of Charles Caldwell*, ed. Harriet W. Warner, Philadelphia, 1855, pp. 146-7.

Bleeding necessary, and Bark, and other stimulating remedies, hurtful in the fevers of your native Country.

A wide field opens for medical investigations in the United States. The walls of the "Old School" are daily falling about the ears of its masters and Scholars. Come, and assist your Uncle and his friends in creating a new fabric upon its ruins. We expect industry, ingenuity & independence from you, and that under your hands the building will receive some of its neatest, and most useful touches. One thing we are confident of,—you will never conceal, nor deny your opinions when the Safety and lives and a whole City require thier being made public.

We expect to confer the first medical honor of our University upon fifteen young men on the 6th of next June. Four of them are my pupils, all of whom are known to you. My Son writes upon "the causes of sudden death, and the means of preventing it." Mr. Pugh against "the healing powers of nature." Mr. Cocke against Jno Hunter's doctrine of "air inflaming cavities by its specific qualities, & in favor of its doing so by its inferior grade of heat inducing debility & *that* inviting morbid action." Mr. Jenks writes upon the "sameness of the Plague & Yellow fever in its causes & modes of prevention." The Subjects of the Theses of the young Gentlemen who do not belong to my Shop are chiefly upon pathological or practical Subjects. One of them by Mr: Darlington will have great merit. It is "upon the influence of habit in curing diseases, & of diseases in curing habits."[41]

. . .

When you see Dr Pinkard, Dr Jackson, & Dr Lettsom, pray make my respectful Compliments to them. I have written to Dr Lettsom lately, and suggested some facts in my letter which are intended to shake his belief in the specific contagion of the yellow fever. Does he know the *two pillars* on which he has rested his Opinions & reputation on that Subject? One of them Dr C. is now a member of our board of health. From the moderation he exercises towards vessels from W: India ports, a Suspicion might be inferred that he has changed his opinion. A great relaxation upon the Subject of importation has taken place in the opinions of our merchants. The lapse of a few years I hope will produce universal conviction among them.

A Dieu! my dear young friend, & be assured of the continuance of the regard of your sincere friend

Benjn: Rush.[42]

* * * * *

[41] In William Darlington's own copy of his thesis, now in the possession of Mr. Lucius Wilmerding, Jr., Princeton, N. J., there is a penciled note, probably in Darlington's hand, which reads as follows:

"When, on the day previous to the *Commencement*, Professor Rush called up this *Thesis*, and its *Author*, for examination on its merits, he made the following remarks to the *Faculty* and *Trustees* present. 'This Dissertation, Gentlemen, is a successful application of Metaphysics to the Practice of Physic: I have read it twice through with attention, and have no objection to make to it.'

"A fellow-graduate, who had just been critically examined, turned to the Author, and laughingly inquired,—'Darlington, is that what you call defending your Thesis?'"

[42] University of Pennsylvania Medical School Library. Two paragraphs and a postscript have been omitted.

At times in his letters and other writings, Rush rises to an almost mystical view of the possibilities of human life in America. In this new nation, if men but bent their minds to the task, the race could be freer, happier, and healthier than in any other time or place. Rush bent his mind to the task. In his millennial optimism there was something of Jefferson's political idealism and something also of the evangelism that produced the great camp-meetings of the period. This may appear a strange combination, but it was characteristic of Rush, who was as eclectic in his philosophical as he was in his medical theories. The point for us is that Rush's work in medicine rested on profoundly sincere patriotic and religious convictions. If this had not been so, his career would have been wrecked by the storms of opposition he several times encountered. If he was mistaken on material points that were not settled until after his time, we ought to remember his own observation, in his *Eulogium* on Cullen, "that the errors of great men partake of the dimensions of their minds." [43]

All this is well illustrated by Rush's conduct in the greatest battle of his life—the long controversy over the origin and treatment of the yellow fever. Having early convinced himself that the disease had spread from a pile of putrid coffee on a Philadelphia wharf, and that depletion was the only effective cure—after all, he had used it on himself,—he would listen to no reasoning on the other side of either question. His enthusiasm for bleeding was criticized by other doctors and quite naturally aroused doubts in some of his patients. Ebenezer Hazard wrote from the stricken city that in one case Rush thrice ordered purges and bleeding but was rebuffed on the third day by the patient, who

> having felt his own pulse, objected against bleeding, as unnecessary. The Dr. pronounced "this opinion one of the most dangerous symptoms in the case; the disorder was extremely critical; not a moment to be lost; send for the bleeder directly. . . . If you are not *bled* to-day, I shall not be surprised to hear that you are dead to-morrow." The patient declared he would lose no more blood; the Dr. declared he would no longer consider him as his patient, left him to *die*, and the man *got well*.[44]

The other opinion, that the fever originated locally, roused up against Rush the fierce tribal loyalty that is called community pride. Rush's clinging to his highly unpopular position is a striking instance of his willingness to sacrifice interest to principle. With the onset of the disease in 1797 there was at first a disposition to pretend there was no fever in town. A friend of Mr. Secretary Pickering's informed him that Rush was behaving

[43] *Essays, Literary, Moral & Philosophical*, Philadelphia, 1798, p. 341.
[44] To S. A. Otis, 12 Oct. 1793; Mass. Hist. Soc., Belknap Papers.

" like a Man escaped from Bedlam " in warning people to flee from the city. Such conduct " will do our City more injury than a thousand such Men and such talents as he has credit for could ever with the best disposition do it good." [45] On September 25 Rush informed Dr. John Rodgers in New York that it was impossible to determine the success of depleting remedies, " for none who recover who are plentifully bled, and purged, are admitted to have had the disease, while most of those who are lost under a contrary treatment, are said to die of worms, falls, colds, and twenty other diseases." [46] Meanwhile journalistic attacks on Rush reached a crescendo, for Peter Porcupine, otherwise William Cobbett, characteristically seized this opportunity to pillory a Jeffersonian in difficulties. Bleeding a man to death, no matter what his disease, Cobbett sagely pointed out, was not the best way of saving his life. In black despair Rush wrote John Dickinson that the citizens of Philadelphia witnessed with indifference " the butchery of my character." With some truth he added that his remedies for the fever " would have met with no opposition this year had I not signed the declaration of Independence, & laterly declared myself a Republican in the Eulogium upon Mr Rittenhouse." At the same time he affirmed, " If I thought by remaining in the city, I should *certainly die*, I should think it my duty to stay. I will not quit my post." [47] Nevertheless, it appears from a letter to Horatio Gates of 30 November that Rush had canvassed the possibilities of a medical post in New York. When this came to nothing, he determined, since he felt practice was no longer possible for him in Philadelphia, to retire to the country and " devote the evening of my life to books and my family." [48]

This counsel of despair was of course never followed. Rush's old friend John Adams, now President, magnanimously appointed Rush treasurer of the Mint in spite of Federalist yelps of protest. Rush was thereby partly compensated for his reduced practice, and to salve his pride he instituted a libel suit against Cobbett. In the following summer the fever broke out once more. Rush had already sent his family to Princeton; soon afterwards he wrote that he was advising his patients to leave and would follow them himself, " for I owe the city of Philadelphia nothing but forgiveness." [49] He did not go far—only to the summer place he called " Sydenham Hut,"

[45] Samuel Hodgdon to Timothy Pickering, 17 Aug. 1797; Mass. Hist. Soc., Pickering Papers.

[46] Libr. Co. Phila., Rush MSS.

[47] 11 Oct. 1797; Hist. Soc. Penna., Logan Papers.

[48] New-York Historical Society, Gates Papers.

[49] To Mrs. Rush, 7 Aug. 1798; letter owned by Josiah C. Trent, M. D., Durham, N. C.

which was on the Schuylkill two or three miles from town. He was making over the house to accommodate the whole family, but the "improvements" were to be a surprise for Julia and he would not tell her of them until they were finished. Writing her after one night there, he speaks with serene pleasure of the coolness, the quiet, and the rural sights that he had not had time or opportunity to enjoy since his school days at West Nottingham:

I forgot for a while the disputes and convulsions which now agitate our country and the globe. . . . I forgot the persecutions of my enemies, and felt as if I could welcome the most inveterate of them to partake of the simple fare of our little cottage. One thing I could not forget,—the sufferings of the sick, the afflicted, and the dying in the city of Philadelphia. My heart was torn with anguish in looking towards it. The deaths yesterday were 40.

All this suggests that Rush had abandoned the ungrateful city to its own troubles. But the fact is that he had already visited his patients in the city that day; and what is more, "This day my Carriage was stopped as in 1793 by several people praying for a visit to their friend or families." [50] Three days later he wrote again, this time in his old vein, confident in his calling, dedicated to his humanitarian task.

Sydenham Hut Augst 29th. 1798

My dear Julia/

My poor heart is sore. Even the retirement & silence of our little hut will not compose it. This day my worthy pupil Mr Smyth breathed his last. Mr. Cocke is still in danger, and I fear will sink this night under deep depression of Spirits. Dr Otto is ill at Woodberry. He sent for me yesterday to visit him. My present distressing engagements forbad it. I sent him a good nurse, for his Physician Dr Campbell informed me that he was deserted and shunned by the whole Village, and that not a creature but himself would hand him even a drink of water. Dr Sayre, Dr Cooper & Dr Proudfit are all confined in Philadelphia. It seems as if no part of the city would escape our terrible visitation. The two hot days last week have added much to the malignity & mortality of the fever. The cool weather will probably encrease the number of Sick, but it will probably render the disease more manageable. This was the case in 1793. . . .

Dont be uneasy about your best friend. I have escaped a Lyon and a Bear in 1793 & 1797 Why should I fear to meet our present Goliah? "He that would save his life shall lose it, & he that will lose his life for my sake shall save it." It is but seldom God furnishes any of his creatures with an opportunity of manifesting thier love to thier fellow men by risking thier lives for their benefit. I am honoured by him in being placed in that Situation. The way is now open and smooth for my usefulness. Public confidence is again placed in me, and my opinions and advice have at last some weight. Under these circumstances I cannot think of retiring

[50] 26 Aug. 1798; letter owned by Josiah C. Trent, M. D., Durham, N. C.

altogether. My business is confined chiefly to my old patients, to strangers, & the poor. I refuse applications daily to wealthy & respectable people. I go to town about 9 oClock, in the morning, and return to our Hut always before Sunset. I am seldom fatigued, and have as yet felt (One day excepted) none of the Achs & pains of 1797.—Adieu.—All here join in love to you. Richd is useful to me in putting up medicines for my patients. Love as usual.

Benjn Rush [81]

Here speaks the indomitable Dr. Rush. He has done battle with a Lion and a Bear; he will now go forth to assail a Giant.

[81] 29 Aug. 1798; Princeton University Library. A paragraph has been omitted.

THE CONTRIBUTION OF BENJAMIN RUSH TO PSYCHIATRY

FRITZ WITTELS

The signature of Benjamin Rush under the Declaration of Independence honors our profession. His contribution to psychiatry must be understood in the spirit of this illustrious document. It is the spirit of the enlightenment period in history, based on Locke and Hume and their disciples in France; humanitarianism, individualism, rationalism in revolt against brutality, superstition, the tyranny of preconceived ideas, falsehoods of yesterday. The main difference between the French encyclopaedists and Rush becomes apparent in his deep religious feelings. His credo is prominent in his therapy of mental illness.

His Christian faith was strong, his optimism unshakable. The latter is a general characteristic of the American spirit, but it is particularly important to a doctor who helps his patients not only with drugs but with a firm belief in his own therapeutic powers. Rush hardly admitted of incurable psychoses. A reader of his therapeutic suggestions could wonder why psychiatry seems to be so helpless in so many cases even today.

Take melancholia, a disease called *Tristimania* by Rush. After a moving description of tristimania and the suffering which it involves, Rush prefaces his therapeutic suggestions with the following words, in their emotional exuberance reminiscent of Jean Jacques Rousseau:

> I should lay down my pen and bedew my paper with my tears, did I not know that the science of medicine has furnished a remedy for it. . . . Blessed science! which thus extends its friendly empire not only over the evils of the bodies, but over those of the minds of the children of men.

This man believed in his therapeutic force, in contrast with the classical medical schools that came after his time. They were strong in their diagnostic laboratories and clinical observations, but were rightly called "nihilists" in the field of therapeutics. Even today we do not believe that we can contribute considerably to shortening the process of genuine melancholia. If we postpone our definite judgment on shock therapy, we may say that melancholia wears off in due course, or else it chronically persists.

Speaking of shock: Rush in his way suggested just that kind of therapy, although he did not know of metrazol nor "electric sleep." Here we happen upon a questionable gift of his strong faculty of faith. He was

criticized for being a "bleeder," even in his day, while shortly after his death bleeding was more and more discarded. Rush believed with dogged, almost paranoiac tenacity in depleting his patients. He cured somatic and mental diseases with copious bleeding, supporting the shock with purging, emetics, even salivation by means of mercury, cold showers of long duration and other procedures in which he took a pride, e. g. in an apparatus which he called a gyrator. The gyrator was a horizontal board on which the patient was placed. The foot end of the board revolved around a vertical pivot, forcing the blood in centrifugal action towards the head. In Rush's opinion, insanity was caused by changes in the blood vessels of the brain; his gyrator was supposed to "shock" the vessels into normal function.

Rush did not create all these remedies. His gyrator was but a modification of an older rotatory machine, introduced by Doctor Coxe. However, Rush believed in this kind of therapy, especially in blood letting, which had its origin in hoary antiquity. Molière ridiculed depleting therapy more than a hundred years before Rush in his comedy *Le Malade Imaginaire*, making his chorus of black-gowned doctors sing: "*Purgare, Seignare, iterum Purgare!*"

It is easy to dismiss such errors with an air of superiority. In some of its descriptions and suggestions Rush's textbook of psychiatry can only interest the antiquarian. On the other hand, one hundred and fifty years from now, our descendants will perhaps look at our present medical convictions with equal disregard and may even return to some of Rush's "errors." Moreover, in a historical survey the errors of a great physician do not count. What does count are the verities, which have survived him for more than a century, as has his extraordinary personality. Great personalities are rare and do not occur more frequently in our days than before. In the midst of a gigantic volume of creative work, Benjamin Rush has grown indeed into what his excellent biographer Nathan G. Goodman (1934) called him: "A man vigorous in mind and body and heroic in stature."

After more than thirty years of studying the mentally ill in the hospital of Pennsylvania as well as in private practice, Rush published his text book *Medical Inquiries and Observations upon Diseases of the Mind* (368 pp.). This was in 1812, only one year before his death.

Undoubtedly, Rush was influenced by the writings of his famous French colleague Philippe Pinel. He quotes Pinel several times in his book, but his indebtedness to Pinel does not become sufficiently clear. Pinel's work

in three volumes, *Nosographie Philosophique* was published 1798 and his *Traité Medico-philosophique sur la Manie* in 1801, eleven years before Rush's final formulations. These two physicians had different ideas about bleeding. Pinel rejected it. They professed identical ideas in all questions of humanitarianism when it came to liberating the mentally diseased from their chains, from real iron chains, as well as from a universal contempt, which resulted in treatment worse than that reserved for criminals and even brutes.

Pinel lived in Paris, witnessed in 1778 the triumph of Mesmerism. Later he saw its decline and its return as animal magnetism. He was among those who condemned Mesmer's practices as charlatanry. Rush did not mention Mesmerism in his book at all, and animal magnetism appears but once in an unimportant context. In those days, professional medicine did not know of hypnotism. In that age of dominating rationalism not an inkling entered Rush's mind that he owed at least part of his therapeutic success to an unparalleled fascinating power emanating from his personality, from his reputation of being the foremost physician of America, the American Sydenham, if not the American Hippocrates.

The investigations of Franz Joseph Gall (1758-1828), which mark the beginning of phrenology were equally unknown to Rush. This is not surprising since the public learned about Gall around 1800 only through the performances of a few quacks.

Rush's textbook reached its fifth and last edition in 1835, although in America until 1883 it remained the only comprehensive book on diseases of the mind. We may view this as a result of the general disinclination of medical science to study the psychology of mental diseases. It was forgotten in the midst of the rapid progress of pathological anatomy, the microscope, biochemistry, later the work of Pasteur and his successors. It was not until after 1880 that Charcot successfully awakened the interest of physicians in hysteria and hypnotism. Charcot's reputation reached the shores of America and revived the lagging interest in mental phenomena. It is safe to say that Benjamin Rush's approach to mental diseases—without a laboratory and almost without a knowledge of the anatomy of the central nervous system—evokes more interest today than it did during the period between this man's death in 1813, and the eighties of the last century. We remember that Freud who began as a brain anatomist and physiologist, after 1895 did not set foot inside a laboratory, including those of experimental psychology, and built his psychoanalysis outside of them. Since psychology has gained a firm footing in the field of mental diseases,

Rush again may become a source of psychiatric knowledge. In this sense we do not only celebrate the two-hundredth anniversary of his birth but possibly a renascence of some of his wisdom. His book—today a rarity for bibliophiles—deserves a new edition.

As in his treatment of somatic diseases so as a psychiatrist Rush was a physician who took hold of his patients in their totality, as individuals. He not only prescribed drugs, some of them obsolete today, but he was interested in his patients as human beings, as suffering fellow-men. He wished to know what they ate, what clothes they wore, the climate in which they lived and worked, their environment, their hopes and their fears. He met his patients as an artist, a curative artist—one total personality, the doctor's, face to face with another total personality, the patient's. Never in psychiatry were more important words spoken than those by Benjamin Rush, which even today should be inculcated upon young students of psychiatry:

> The first thing to be done by a physician under this head, is to treat the disease in a serious manner. To consider it in any other light, is to renounce all observation in medicine. However erroneous a patient's opinion of his case may be, his disease is a *real* one. It will be necessary, therefore, for a physician to listen with attention to his tedious and uninteresting details of its symptoms and causes. . . .
>
> He [the doctor] should hear with silence their rude or witty answers to his questions and upon no account ever laugh at them or with them. . . .

We know (quite a few) alienists who disregard this advice and laugh heartily at the antics of their demented patients.

Rush possessed a natural dignity which led him down the right path. It is more than good bedside manners. We realize that his humane principles could be pronounced only after science had defeated ignorance and brutality. Rush mentions the time when the insane were cruelly punished because they had blasphemed the Lord, the Father, the Son and the Holy Ghost. Their tongues were cut out, they themselves were burned alive or hanged. " To the influence of the science of medicine we are indebted for teaching that these opinions (of the insane) are generally as devoid of impiety as an epileptic fit; and for consigning by that human discovery the deluded subjects of them to the cells of a hospital instead of a jail and to the hand of a physician instead of the hands of the last officer, of what has improperly been called criminal justice."

Civilized society had first to acknowledge these facts before they could understand Rush pleading for hospitals for the insane, well equipped with the amenities of life. " The great advantage which private madhouses have

over public hospitals is derived chiefly from their conforming to this principle of human nature; which the highest grade of madness is seldom able to eradicate."

The truth of this statement shines from a report by Rush on a cured patient whom he asked—he says modestly " whom her doctor asked "—to forgive him because he had deprived her of her liberty. She exclaimed: " Forgive thee! Why, I love the very ground thou walkest on."

* * * * *

Philippe Pinel did not bother much with a detailed and systematic classification of the psychoses. In contradistinction to him, Rush presented us with an unusually distinct nosography which we have in part abandoned today; in part, we call the diseases by different names without seeing them in all too different a light. We have spoken of his *Tristimania*. The name seems to be more appropriate than the time-honored name melancholia, since we do not believe any more in " black bile " (melas cholos) being the cause of the product of this aberration. However, the more appropriate word, Tristimania, has not been accepted by official psychiatry, at least not yet.

What we call paranoia, a derangement seizing but part of the personality, was called by Rush Anemomania. He also knew that paranoia (anemomania) is almost always preceded by hypochondria. He differentiates between acute and chronic derangement, calling the former " *delirious mania*," Van Swieten's *Mania Furibunda*, and the chronic form *Manicula*. A third, also chronic, kind with general torpor he called *Manalgia*. As Adam, the father of man, so Rush in the kingdom of insanity found himself all alone in the midst of unnamed phenomena and like Adam he gave them names, arbitrary names. He has invented many names forgotten today, among them *Phrenimania, Synochomania, Micronomia* and *Anomia*. The latter two terms denote those with undersized and not existing morals, the forerunners of moral insanity or corrupted superego, the psychopath.

Rush based his descriptions not only on clinical cases as he or other clinicians observed them, but also introduced figures from literature, e. g. Shakespeare's King Lear and Edgar of the same tragedy who mimics insanity so well that Rush acknowledged his antics as genuine. Further the king's jester, whom Rush used as an example of *Dissociation*, a man who combines foolishness with wit and often cunning shrewdness. This jester is representative of a large group whom—as Rush says—we rarely see in hospitals, but more frequently in life. Everybody knows them, they are not insane, but not normal either, they speak and think by leaps and

bounds, bizarre people, " a little cracked," often amiable and usually harmless. Something is wrong with them, but even today it is not easy to determine what it is. They are eccentrics of a particular brand.

Some psychiatrists in America, perhaps a majority, look askance at the introduction of fictitious characters into psychiatric investigation. They are unwilling to see that creations of mythology or of great writers can be used as examples for psychological understanding. Rush quoted from Sophocles (Ajax), from the Bible (Nebuchadnezzar), and from other books. He defended his choice with the words " The poets view the human mind in all its operations whether natural or morbid, with a microscopic eye and hence many things arrest their attention which escape the notice of physicians." As a matter of fact, Shakespeare's demented types have always impressed experts by their scientific correctness: Hamlet's tristimania, Ophelia's amentia, Lady Macbeth's somnambulism and delusional washing compulsion, Othello's epilepsy, etc.

His quotations from fiction notwithstanding, Rush has gathered in his book and previous publications an extraordinary wealth of clinical observations of his own. Some of these observations have tempted medical historians to call him a forerunner of modern psychological discoveries. We live in a time which likes to find forerunners, forseers and even priorities where none really exist. Goodman mentions Rush as a forerunner of Freud because he made his patients talk to him and listened attentively when they tried to verbalize their pains. Rush knew also that forgotten experiences may lead to mental illness. He taught: " Many diseases take place in the body from causes that are forgotten, or from sympathies with parts of the body that are supposed to be in a healthy state. In like manner depression of mind may be induced by causes that are forgotten; or by the presence of distress with which it was at one time associated, but without reviving the cause of it in the memory. . . ." One might read into this quotation a remote resemblance with early psychoanalytic theories.

Rush's mental therapy will often impress the modern psychiatrist as based on premises which are all too rational. He believed in tricks, in influencing the irrational mind of the insane directly with logic. He thought e. g. one could secretly place a little animal, perhaps a mouse, into the faeces of a patient, in order to make him believe that the delusive cause of his disease was now out of his system. Another patient who imagined that part of his body was composed of glass was made to fall and then shown broken glass which had been placed underneath him.

On the other hand we find much wisdom in Rush's advice. The im-

portance of occupational therapy was quite clear to him and he elaborated it at great length. Psychiatrists could still profit from his schemes in this field. He quoted two lines by Cowper:

> Absence of occupation is *not* rest
> A mind quite *vacant* is a mind distress'd.

Rush warned us of the wrong approach: do not try amusements in a case of melancholy. Amusements and mirth, he said, " works as hot water to a frozen limb."

There is no doubt that even some of his little tricks which might be meaningless and even absurd should anybody else try them, may have had a miraculous effect in Rush's own practice. As mentioned above, he himself was not aware that his mental cures could not be evaluated objectively but became effective because of the tremendous suggestion emanating from his reputation as America's greatest doctor. There was often little importance in what he did: that *he* was there and spoke became important. As long as he lived and cured, he actually saw but few incurable diseases. He could perform miracles and his magnificent cures outshone incurable cases to a degree that in his optimism he could hardly see them. Optimism was part of his success, comparable to the daring mountain climber who does not believe in the possibility of a failure.

When all is said, enough objective truth, unsurpassed to this day, is left to posterity in his observations and definitions, e. g. his definition of phobia as a " fear of an imaginary evil or undue fear of a real one." He added to his definition that we have two infallible remedies against fear: reason and religion. This is an experience to which we cannot wholeheartedly subscribe unless reason means Rush's own, the great magician's reason, and religion the prophet who preaches it. He quoted Pascal: " I fear my God, therefore I have no other fear."

Describing phobias, scores of them, Rush occasionally displays his sense of humor:

* Rum-phobia is a very rare distemper. I have known but five instances of it in the course of my life. . . . Doctor-phobia is complicated with other diseases. It

* The quotations in this paper are taken from Benjamin Rush's *Medical Inquiries and Observations Upon Diseases of the Mind*, 1812, fifth edition 1835,—except those marked with an asterisk; these are quoted from Charles K. Mills, Benjamin Rush and American Psychiatry, 1886, *Medico Legal Journal*, 4. In addition, the author has made use of Nathan G. Goodman's *Benjamin Rush*, University of Pennsylvania Press, Philadelphia, 1934; Richard H. Shryock's The Psychiatry of Benjamin Rush, *American Journal of Psychiatry*, 1945, vol. 4, and Iago Galdston's Diagnosis in Historical Perspective, *Bulletin of the History of Medicine*, 9, 1941.

arises often from the dread of taking physic, or of submitting to the remedies of blistering and bleeding. It might be supposed to be caused by the terror of a long bill, but this excites terror in few minds, for who ever thinks of paying a doctor's bill while he can use his money to advantage another way? Doctor-phobia generally goes off as soon as the patient is sensible of his danger. . . . Church-phobia. This became an epidemic in the city of Philadelphia, hence we see half the city flying in chariots, phaetons, chairs and even stage wagons, as well as on horseback, from the churches in summer as soon as they are opened for Divine worship. In winter they drown their fear of church in plentiful entertainments.

Of Negro-mania, he says that it prevailed in the Eastern and Middle, but it is now confined to the Southern States; of land-mania, that it is a frequent disease in every part of America—a room in a gaol instead of a hospital is a cure for this mania; of horse-mania, that a race, a carriage or a riding-horse are often an object of greater attraction to persons afflicted with this mania than a wife or a mistress; of liberty-mania, that it is a disease which shows itself in visionary ideas of liberty and government.—Monarchical-mania is when people believe that a king can do no wrong.—Republican-mania is when a man attempts to introduce a Republican form of government when the people are not prepared for it by virtue and knowledge.—Donation mania is when people impoverish their families by extravagant contributions to public undertakings.—He discourses also on military-mania, duelling-mania, hunting-mania and gaming-mania. Of ecclesiastical mania, he caustically remarks that it includes bigots of all descriptions; and of humane-mania, that it is strange that an excess of humanity should often cause a sort of madness. Rambling-mania, national-mania, love-mania, pride-mania, dress-mania, pleasure-mania, rouge-mania, musical-mania, poetical-mania and mathematical-manias likewise all receive his attention.

* * * * *

Many reforms suggested by Benjamin Rush were never carried out, even to this day. He was one of the first abolitionists in America and also violently opposed capital punishment. "Dr. Rush," says one of his biographers, "was among the foremost, if not the very first, to recommend labor and solitary confinement in place of capital punishment, and he ought to be regarded as one of the earliest reformers of the harsh and cruel system of criminal jurisprudence, which has so long found favor in the country of our ancestors."

The words of Benjamin Rush on alcoholics are classics and are still a cry in the wilderness:

* The establishment of a hospital in every city and town in the United States for the exclusive reception of hard drinkers. They are as much objects of public humanity and charity as mad people. They are indeed more hurtful to society than most of the deranged patients of a common hospital would be if they were set at liberty. Who can calculate the extensive influence of a drunken husband or wife upon the property and morals of their families and of the waste of the former and corruption of the latter upon the order and happiness of society? Let it not be said that confining such persons in a hospital would be an infringement upon personal liberty, incompatible with the freedom of our governments. We do not use this argument when we confine a thief in a jail and yet taking the aggregate evil of the greater number of drunkards than thieves into consideration and the greater evils which the influence of their immoral example and conduct introduce into society than stealing, it must be obvious that the safety and prosperity of a community will be more promoted by confining them than a common thief. To prevent injustice or oppression no persons should be sent to the contemplated hospital, or *Sober House*, without being examined and committed by a court consisting of a physician and two or three magistrates or commissioners appointed for that purpose. If the patients possess property, it should be put into the hands of trustees to take care of it. Within this house the patient should be debarred the use of ardent spirits and drink only, for a while, such substitutes for them as a physician should direct. . . .

Rush is at his best when pleading in the name of humanity and science, the two being but one for him:

In reviewing the slender and adequate means that have been employed for ameliorating the condition of mad people, we are led further to lament the slower progress of humanity in its effort to relieve them, than any other class of the afflicted children of men. For many centuries they have been treated like criminals, or shunned like beasts of prey; or, if visited, it has only been for the purpose of inhuman curiosity and amusement. Even the ties of consanguinity have been dissolved by the walls of a mad house, and sons and brothers have sometimes languished or sauntered away their lives within them without once hearing the accents of a kindred voice. Happily these times of cruelty to this class of our fellow creatures, and insensibility to their sufferings, are now passing away. In Great Britain a humane revolution, dictated by modern improvements in the science of the mind, as well as of medicine, has taken place in the receptacles of mad people, more especially in those that are of a private nature. A similar change has taken place in the Pennsylvania Hospital, under the direction of its present managers, in the condition of the deranged subjects of their care. The clanking of chains, and the noise of the whip, are no longer heard in their cells. They now taste of the blessings of air, and light and motion, in pleasant and shaded walks in summer, and in spacious entries, warmed by stoves, in winter, in both of which the sexes are separated and alike protected from the eye of the visitors of the Hospital. In consequence of these advantages, they have recovered the human figure, and with it, their long forgotten relationship to their friends and the public. Much, however, remains yet to be done for their comfort and relief. To animate

us in filling up the measure of kindness which has been solicited for them, let us recollect the greatness of its object. It is not to feed or clothe the body, nor yet to cure one of its common disease; it is to restore the disjointed or debilitated faculties of the mind of a fellow creature to their natural order and offices, and to revive in him the knowledge of himself, his family and his God.

The man who wrote these lines deserves the surname bestowed upon him: *benefactor of the human race*. He did for America what Pinel and Esquirol did for France. We learn that he was an opinionated man, that it was difficult to get along with him. He could not be directed, nor coordinated. For a short time he had a quarrel even with General Washington. However, is it possible to measure an overtowering personality as his with the ordinary yardstick? He believed in his star, his God, his science and in democracy. These he united in his psychiatric work. In his textbook he exclaimed: " In a government in which all the power of a country is representative and elective, a day of general suffrage and free presses, serve, like chimneys in a house, to conduct from the individual and public mind, all the discontent, vexation and resentment, which have been generated in the passions, by real or supposed evils, and thus to prevent the understanding being injured by them."

Mind you! He believed democracy to be a prophylactic of mental diseases.

Let me conclude this paper on a great American physician and psychiatrist with his own words at the end of his book:

Here the reader and the author must take leave of each other. Before I retire from sight, I shall only add: if I have not advanced, agreeably to my wishes, the interests of medicine by this work, I hope my labours in the cause of humanity will not be alike unsuccessful; and that the suffering of our fellow creatures, from the causes that have been mentioned, may find sympathy in the bosoms and relief from the kindness of every person who shall think it worth while to read this history of them.

THE AFTER-DINNER ADDRESS

PLANS FOR THE PREPARATION OF THE ARMY MEDICAL DEPARTMENT HISTORY, WORLD WAR II

J. H. McNINCH

The topic of my remarks this evening is a rather sober one to discuss after a dinner so enjoyable and so satisfying as the one we have just finished. Nevertheless, I keenly appreciate the opportunity to address this Association on the subject of the history of the Medical Department in World War II because I believe that you, as an organization and as individuals, will have a more profound interest in our undertaking than most any other group.

Allow me, in the first place, to bring you the greetings of the Surgeon General. General Kirk is giving the historical program a full measure of support and looks upon the completion of the history as one of the important activities of his office. He is fully cognizant of the immense task involved, and I am sure that he will welcome any suggestions and help that this group may give his office.

At the outset, I may also say that it is with a sense of humility that I have accepted the invitation to appear before this Association. I make no claim to being a historian. Until the fall of 1945, when I was appointed director of the Historical Division, I had had no direct connection with historical work. Since this was an utterly new and strange field to me, I was astonished by my appointment as historian of the Medical Department. Moreover, I confess that it was somewhat difficult to adapt myself to my new assignment, but as time elapsed I have become familiar with the craft of the historiographer. As a matter of fact, I have even learned to understand his esoteric vocabulary. No longer am I dismayed when my associates talk of primary and secondary sources, bibliographical aids, diplomatics, internal and external criticisms, objective sources, and the like. And, too, I no longer feel intellectually impoverished when confronted with a manuscript including such terms as "et passim" and "non videmus." In fairness to the historians on my staff, I should add that they have told me that their high-flown professional lingo is extremely limited as compared to that of the sociologists and economists. For this I am grateful. Despite the fact that I make no claim as a historian, I do have a very vital interest in medical history.

No one, I'm sure, will question the fact that a thorough and painstaking

history of our medical experience in World War II can and must be written. The great catastrophe in which we engaged, ushered in a new era of the healing art. Although war stimulates advancement in practically every technical field, it is doubtful if any field felt this stimulation more directly than medicine. Through the history, we shall be able to record these advances in the medical sciences so that our knowledge may accrue to the benefit of a peaceful world. When I think of the history in this light, I find my task a most satisfying one.

As you perhaps know, the Medical Department is the pioneer agency of the Army in historical work. Following both the Civil War and World War I, comprehensive histories were published under the respective titles *A Medical and Surgical History of the War of the Rebellion* and *The Medical Department of the United States Army in the World War*. In these volumes there is invaluable information for those charged with the medical preparations for succeeding wars. In this connection, however, I might say that some authorities have pointed out that these histories were not used as widely as they should have been. Far too often these tomes were relegated to archival desuetude. Perhaps the lack of use accorded the medical histories of previous wars can be attributed to the fact that they were not presented in a manner to insure maximum usefulness as well as readability. It is our hope that the history of World War II can be organized and presented along lines that will make it useful for both military and civilian purposes.

In the time at my disposal, I should like to give you a rapid sketch of the plan which we propose to follow in writing this history. After studying the two previous histories and evaluating our experience in the recent conflict, we felt that we were confronted with two problems stemming from the two distinct types of material accumulated during the war years.

The first category of material which we must record, deals with the operation of the medical service, embodying all those complex and highly organized activities which made possible the efficient functioning of the service under the difficult conditions imposed by modern warfare. Here we have to deal with organizational and operational planning, supply and fiscal activities, construction of hospitals, evacuation, training and assignment of personnel, and a host of other subjects.

In the second category of material for the history, we have a wealth of clinical experience in curative medicine, surgery, preventive medicine, psychiatry, physical medicine, dentistry, and veterinary medicine. As we considered the two categories of material, it was concluded that it would be

essential to the success of the history to separate the operational and administrative subjects from the purely clinical data.

Moreover, it appeared that there were certain topics of an operational and administrative nature which could not be dealt with as exhaustively in the operational and administrative volumes as our experience warranted. Hence, we envision a series of monographs covering certain highly important matters which will supplement the narrative or operational volumes.

Finally, we feel that a popular summary of the Medical Department's experience prepared for the general reader might be desirable. As you know, the achievements of military medicine made a profound impression on the public. Journalists have found in the Department's work a rich mine of copy, but the entire story has not yet been told fully and effectively. Hence we are considering a popular history for publication possibly by a commercial firm. There are innumerable obstacles which must be overcome in this connection, but we hope that the popular history can be produced—although it is not one of our main objectives.

Thus, the history as now visualized will be divided into three main divisions in keeping with the interests of several specialized audiences:

Part I, the operational and administrative history, will be a true narrative history designed for the general reader. This part will be limited to eight volumes of 400 to 600 pages each. It will be written by competent historians and will be incorporated in the overall official history of The War Department. It is estimated that at least four years will be required to prepare this part of the history since its compilation involves long and painstaking research in sources accumulated from Medical Department facilities throughout the world.

Part II, the clinical and technical history, will be written for professional readers: physicians, dentists, veterinarians, and scientists working in allied fields. As this section of the history will be prepared for readers chiefly interested in clinical data, it is planned to eliminate material pertaining to the operational and administrative aspects of military medicine, except when such material is necessary to the development of well-balanced clinical documents. The number of clinical and technical volumes to be published has not yet been determined. I wish to stress the fact, however, that early publication of these volumes is planned in order that the material may be made available to the various professions for application in current practice.

Part III, the medico-military monographs, will deal with various specialized subjects of interest primarily to officers of the Regular Army. These monographs will be prepared over a long period of time and will be given limited distribution. Among the tentative subjects to be treated in monographs are: effective utilization of specialists, standardization of the bed credit system, physical standards and manpower problems, and many others. We believe that the average historian is not competent to prepare the analytical studies that will make up the monograph series. This is a job for specialists with first-hand knowledge or an intimate interest in the material or for committees of such specialists. It is proposed that this phase of the history be a continuing project of the Office of The Surgeon General and I feel reasonably sure that it will be since future operations of the Medical Department may be markedly improved if its past experience is carefully analyzed and evaluated.

As my thoughts matured on the division of the history as here outlined—I concluded that the proposed scheme of presentation should be placed before a group of authorities for their consideration and advice. Consequently, it was proposed that an Advisory Editorial Board be appointed to assist The Surgeon General in the formulation of overall plans and policies relative to the preparation and publication of the history. The group was appointed in April and recently held its first meeting. Members of the Board, many of whom are perhaps well-known to this group, are:

Colonel ALBERT G. LOVE, USA, Retired Chairman; formerly Director of the Historical Division, Office of The Surgeon General.

Major General PAUL R. HAWLEY, USA, Retired, formerly Chief Surgeon in The European Theater of Operations, and now Chief Medical Director, Veterans' Administration.

Brig. Gen. RAYMOND A. KELSER, USA, Retired, formerly head of the Army Veterinary Corps.

Brig. Gen. RAYMOND W. BLISS, USA, The Deputy Surgeon General.

Brig. Gen. MALCOLM A. GROW, USA, The Air Surgeon.

Brig. Gen. S. BAYNE-JONES, USA, Deputy Chief, Preventive Medicine Service, Office of The Surgeon General, and Director, U. S. A. Typhus Commission.

Colonel PAUL I. ROBINSON, M. C., Commanding Officer, St. Louis Medical Depot.

Dr. MICHAEL DEBAKEY, formerly Director, Surgical Consultants Division, Office of The Surgeon General and Professor of Surgery, Tulane University.

Dr. LEWIS H. WEED, Director, School of Medicine, Johns Hopkins University.

Dr. MORRIS FISHBEIN, Editor, Journal of The American Medical Association.

Dr. J. BEN ROBINSON, Dean, School of Dentistry, University of Maryland.

RICHARD H. SHRYOCK, Ph. D., Professor of History, University of Pennsylvania.

Major JOHN J. LENTZ, M.A.C., Recorder.

The proposed method of presentation of the history was submitted to the Editorial Board and I am glad to report that the Board approved it unanimously. A Sub-committee of the Board was appointed consisting of General Kelser, Colonel Love, and Dr. Fishbein. This committee will review outlines for the history and determine space allocations to be given each topic in the clinical and technical volumes.

In addition to the Editorial Board, we shall have a group of consultants to advise the Historical Division on the history of various specialized subjects. Dr. Sanford V. Larkey, formerly historical officer in the European Theater of Operations, is the first consultant appointed in this capacity.

A day seldom passes without my being asked this "sixty-four dollar question": "What progress are you making on the history?" I find it difficult to answer this inquiry precisely for, as you well realize, the mills of the historian grind slowly. During the war, efforts were largely concentrated on the accumulation of source materials, the abstracting and indexing of documents, the preparation of fiscal year reports and special studies required by higher authority.

Although *only* a limited amount of definitive work was accomplished while the war was in progress, the early efforts were worthwhile as the Historical Division accumulated an immense amount of data which has been filed and made ready for research purposes. Perhaps we might have accomplished more, but you must bear in mind that personnel was scarce and that during operations the prosecution of the war took precedence over all other activities. We were fortunate enough to dispatch Medical Department historical officers to every active theater of operations. Some of them have compiled excellent theater histories; others tracked down and preserved valuable documents that otherwise would have been lost or destroyed.

I wish to assure you that every effort will be made by the Medical Department to write an objective, unbiased history of its recent experience. It is not our intention to glorify or laud our achievements—rather we seek to produce a cautious evaluation of medicine at war that will emphasize errors as well as successes. In this connection, I should like to quote—et passim—from a recent letter written by the Secretary of War to Dr. Douglas Freeman, eminent military historian, now associated with the *Richmond* (Virginia) *News Leader*.

Secretary Patterson wrote: "There is agreement in the high command that the history must provide the Army with facts needed for self-criticism.

The history now being written is designed to set forth not only what was done, but also how it was done and why decisions were made. . . . I believe that a history such as we have in mind will, if executed according to plan, do much to take the curse off the term 'official.' We do not intend that it shall be put out as official in any exclusive or definitive sense. We have a warrant to that intent in the character of the writers who are associated with the enterprise. . . . Every effort, in short, is being made to produce a history which, while useful to the Army, will also be of maximum assistance to historians of the future in getting at the information they need."

The principles enunciated by the Secretary of War regarding the War Department's official history will apply with equal force to the history of the Medical Department.

It has been a pleasure to address you. I hope that my remarks have given you a fairly clear picture of the very large undertaking which faces the Medical Department. I realize that I have perhaps omitted many subjects which would interest you, but summarizing such a large program in the brief time allotted me is rather like trying to condense the technicalities and ramifications of atomic energy into a brief after-dinner talk.

I trust that you will await the fruits of our labor with interest—and also, of course, with patience—for we have undertaken one of the most ambitious publishing ventures in the field of medicine. I am confident, however, that the history can be successfully completed and to that end the cooperation of this Association is invited.

RESEARCH AND MEDICAL HISTORY

CLAUDIUS F. MAYER

On this first postwar meeting of our Association it may be worthwhile to reflect upon certain general problems, problems which medical history shares with other fields of science. The war is over now, or rather it just passed into its phase of decline. Men in every field of human life are engaged in estimating the damage it produced. Politicians as well as scientists may talk now of reconstruction of institutions, rehabilitation of the disabled, and of the difficulties that arise from the pathological overgrowth of our technical age.

While government statisticians may give us exact figures on the loss of human life by air-raids and on the casualties of battlefields, no one can furnish us with an accurate account of the war injuries to the mind and to our cultural values; no one can yet estimate the crippling and stunting effect this war had upon human evolution. Still too fresh are the wounds of science and culture to venture a forecast of safe healing; and still there is no sufficient recovery from the traumatic shock to feel the loss of limbs or to hope for their regeneration.

From scattered official reports, from notices in journals and from private letters it appears that the loss in Old World culture is tremendous:—fountains of scientific thought and rivers of communication are dried out forever, tools of research are wrecked or completely annihilated together with the hands who held them. The devastation is so thorough that little can be salvaged from the wreckage, too little anyhow for a healthy and vigorous spontaneous regeneration.

With its resources of knowledge practically untouched by the ravages of war, American science has the task, nay a sacred obligation, to clear away the debris, to make the rivers of thought again navigable, to pick up the tools of Old World culture, and to put them in the hands of properly qualified young people. America must safeguard and further develop the experience of mankind, transmitted through many generations, but almost lost in the world war.

There is much to do and many details to work out for the rescue of our scientific heritage. In fact, not much can be done without a complete overhauling of our own scientific machinery. Our tools and research methods must be readjusted so that they can produce ten times as much as

before in compensation for all that was lost, and to satisfy the needs, the spiritual needs of the many millions who all over the world are suffering from a terrible disease aptly diagnosed by a Swiss doctor as " inanitas mentis."

In countless articles, published here and abroad, various treatments are offered to deal with the pandemic of mental inanition. Preventive measures are proposed against it, and radical interventions suggested for its elimination. Presidential addresses and scientific societies point out new paths on which to proceed or old methodological difficulties to be removed. At the last meeting of the American Association for the Advancement of Science, held on March 29, 1946, Section L, that is the Section on History and Philosophy of Science, presented a symposium on methodology of science, with special respect to the connection of government with research. The symposium felt that individual research workers as well as research institutions should be united in some kind of national organization, this to be the first step toward the successful rescue of our scientific heritage.

On our first postwar meeting it is appropriate for us also to consider the wreck of medico-historical research in Europe, the chances of restitution, the methods of readjustment, and the possibilities of future development in the field of medical history in our country.

I am going to plead before you today that the science of medical history in which all of us are interested should assume new additional responsibilities; that it should take the leadership in conservation of the research material of medicine as well as in teaching the theory of medical research; and that our Association should contemplate the establishment of a sound organization, a chain of posts for professional medical historians in a network of institutions so that, by means of these posts, medical research might have the long-desired union of all its branches, a union of irresistible strength.

But what is research? There are various definitions of the word: some short and some very lengthy, some in the Hollywood version with a kind of magical investment, and some in the lay version. The term itself is the mostly abased and the most incorrectly applied word of the dictionaries, especially in the English language. Both the office girl, looking for a document on file, and the library girl, selecting a few titles for a list of references, confidently call their searching a research, without troubling their heads much about the exact meaning of this word.

There are many other activities which people leisurely group under the term " research," such as probing, scrutinizing, seeking, studying,

reading, exploring, inquiring, examining, etc. Though the common element in all these activities is the act of searching, what makes them different is the tool used, and the hand holding the tool, or rather the mind that moves the hand with the tool in a certain direction. In the hand of a scholar, whose mind is set upon tracking down the truth, the tool will be put to such a use that either new facts will be revealed, or old facts will shine in a new light. To his systematic search is added his reflective thinking, and this reflective thinking qualifies his work as research.

Since the result of true research is always either a new truth or a new interpretation of relationships, originality is its essence. Efficiency of research facilities and research institutions, like efficiency of individual workers, should be evaluated by the criterion of originality alone, without any regard to the usefulness of the result.

Unfortunately, however, as Ehrlich has already recognized, every investigation requires money, patience and luck ("Geld, Geduld und Glück"), and every money-lender wants something useful in exchange for his dollars. The aspect of utility brought with it a classification of research into fundamental, basic and applied (Loeb. *Science*, 1946). It is called fundamental when its objective is the understanding of the laws of Nature, the discovery of new facts, and the theoretical development of science; it is basic when it considers the possible application of fundamental discoveries to our modern life; it is applied when its chief purpose is the elaboration of ways and means by which the fundamental truth can be turned into gadgets, weapons, drugs, etc.

Research in the applied sciences is always a mixture of all three elements. Medicine itself, being partly an applied science, is also a mixture, but, in addition to the three elements, it shows two sharply separated research activities: 1) experimental research incidental to medicine and performed in the laboratories of allied sciences, 2) pathological and clinical research, or medical research proper, which includes the human factor and is carried out by qualified men in medical schools and hospitals.

To which category does medical history belong? The answer to this question depends greatly upon the objective of our science. As any other historical science, medical history is a reconstruction of the past from the available sources by means of reflective thinking of the historian. His task is to investigate past events, to understand them, and, by his understanding, to explain the genesis of medical thoughts. History is a genetic science, and historical understanding is genetic understanding. As a genetic science, medical history has its undisputed value since no one

doubts that thorough knowledge of the present, of concrete institutions as much as of acts of the contemporary mind, comes only from a knowledge of their evolution. By searching the genes of the evolution of medical science the historian is more than just a curator or keeper of traditions and of old books:—he is a geneticist or an embryologist of medicine.

We have passed the era of the oriental conception of history which exhausted itself in the mere enumeration of facts. We are in search of a higher level of historical understanding, of a philosophy of medicine. With such an objective, medical historical research can be classified neither with research incidental to medicine nor with medical research proper; it needs a category for itself, being essentially the crowning vault over the two pillars of medicine: experimental science and clinical art.

Keeping the true objective of medical history in mind, and recalling that the essence of any research is originality, we must now quickly survey how closely we approach the ideal, how successfully we perform our function, and how well we are equipped to assume new responsibilities in salvaging and regenerating knowledge.

Being the Editor of the Index-Catalogue, one of my official functions is to observe the growth of medical literature and to analyze its contents. For more than two years I have paid special attention to the growth of medical history and since May 1944 I have been able to record more than 3000 publications of medico-historical interest. More than 75% of these articles were written by North American authors. For the organization of this literature a special scheme of classification, intended originally for a planned International Abstract Journal of Medical History, seemed to me suitable and filled my own needs.

Every article whose author discussed the past was included in my record, and not those alone which were published in our single professional journal of medical history. Looking over the record, my general impression is that there is too much sporadic enterprise, too much repetition but little research. The great bulk of medico-historical publications in this country not only does not show the hallmark of research, i. e., originality, but it may become a dangerous, misleading source for students of the past.

There are many pilgrims on the trodden road who light their little candles and stick them in front of the altars of medico-historical hero worship. But even the trodden road often has its rocks, causing them to stumble and making them disheartened after a few miles back into the past. Few are the pioneers who open up new paths into the unknown, and still fewer have the equipment to dare to undertake organized expeditions into

hidden lands of the past. Thus, much of the medico-historical activity in our country is more or less the work of amateurs who are stimulated chiefly by occasions and anniversary dates to dress up in historical colors the scenery of celebrations.

Another striking feature of American medico-historical work at large is the paucity of its fields and its tendency to concentrate upon local and superficial subject history of the 19th and 20th century. If what Churchill said is true that "the longer you can look back the further you can look forward," then American medical history is suffering from short-sightedness, missing both ends of historical objectives: the genetic understanding of the past, and the perspective of the future.

A percentage distribution of medico-historical articles according to topics shows that the research itself and the methodology of our science forms only about 1.8% of all the articles written by medico-historians during 1944-45; the discussion of source material and reference tools, including bibliographies represents only 2.5% of the literature in my collection; conservation of sources, 1.2%. Medico-historical articles suitable for classification by eras rather than by subjects rated only 17.97% during the same period; of this, 0.65% goes to Egyptian and African medicine (the lowest figure in the entire series); 1.2% to Asia (Babylon, India, China); 1.87% to American antiquity; 1.2% to Hebrew and Arabic medicine; 1.8% to the monastic medicine and European Middle Ages; 2.5% to the 15th and 16th centuries (many of the articles being written for the Vesalius anniversary); 1.8% to the 17th and 18th centuries; 3.74% to the 19th century, and 1.87% to the 20th century.

On the other hand, subject histories rate 44.91% during the same period; 5.61% of our work is on portraits, 6.2% on medical journalism and nomenclature, while 12.5% is the rate for biographies, memoirs, reminiscences, obituaries, jubilees and anniversaries. All in all, this survey shows that many fertile fields of medical history have no cultivators in America.

Just for curiosity, it may be interesting to compare the distribution of medico-historical topics with the literature of pre-war years as recorded in some of Sarton's bibliographies. For the period from December 1935 to September 1936, the bibliographies No. 45, 46, 47 and 48, published in *Isis*, list 2445 works on history of science in general. In the chronological half of these bibliographies one can find the following number of medico-historical articles by centuries:

5th cent. B. C.		11	8th cent. A. D.		—
4	"	7	9	"	10
3	"	—	10	"	—
2	"	—	11	"	6
1	"	—	12	"	22
			(Maimonides anniv.)		
1st cent. A. D.		3	13	"	7
2	"	12	14	"	8
3	"	1	15	"	15
4	"	2	16	"	39
			(Paracelsus anniv.)		
5	"	—	17	"	28
6	"	2	18	"	55
7	"	1	19	"	55

Here again it is evident that our American medico-historians concentrate their efforts chiefly on the most recent periods of medical progress, the search of earlier centuries being almost exclusively left to men working or trained abroad.

In the second half of the *Isis* bibliographies, where the literature of the history of science is classified by cultural groups, it was surprising to find that American antiquity itself is almost completely neglected by American medical historians, a field which offers the greatest opportunities for study in this country. Little or nothing has been also published on the medicine of East Asia, or Babylon-Assyria, of Byzantium, while Greece shared only 5 articles, India 6, Rome only one, and the Middle Ages only eight.

No doubt the field of medical history needs many more men who can devote their full time to historical research, especially when we attempt to compensate for the loss that our science suffered all over the world. There is a long list of defunct historians, defunct periodicals, societies, and medico-historical institutes. In Germany, the famous Leipzig institute is gone, and no one knows exactly what happened to the others; the small medico-historical institute in Würzburg became the breakfast room of the medical faculty already in 1935. Research in many special fields will not be continued because there is no one as yet to pick up the tools, no one properly equipped to continue the work of the pioneer.

Recruitment of professional medico-historians will be therefore our main problem in the first phase of regeneration of our science. In my opinion, a basic qualification of medical and linguistic knowledge is essential for the future medical historian, but this is just a preliminary. Further study and training is necessary, since, as any other scientific research worker,

he must have knowledge of the technical methods of work, a suitable habit of thought, a certain amount of imagination, accuracy of observation, full understanding of present-day medicine and its experimental methods, and a sharp discriminative power to judge the falsity of statements.

The greatest obstacle to such a recruiting program is at present that only few men are prepared to undertake the career of a medical historian because there is no such thing in this country as a medico-historical career. Good prospects for the job by necessity have to earn their livelihood by practice or other means. Even if they would take the trouble of spending a year or two in our one medico-historical institute, the only one that, by its full equipment and facilities can be considered as a training school of professional medico-historians, there is at present no assurance that careers will be provided for them at the earliest possible moment.

There are, as a survey of Sigerist showed a few years ago (in 1939), very few academic posts for medical historians, and even at these posts the appointments are of uncertain development and destiny. In contrast, small Venezuela may be mentioned that has a chair for medical history, while in Mexico the establishment of a professional permanent chair was recently considered. Russian papers brought the announcement that in the Soviet Republic the history of medicine became an obligatory part of the 6-year educational program of medical students, and that fifty medical professors were convoked to Moskva to discuss the details of a suitable curriculum of our science.

Though we have about 25 local medico-historical clubs in this country, and one national association with about 500 members in the U. S., none of the clubs nor the association has proper funds to finance a large-scale organization of professional medical historians. None of them has sufficient influence to raise its voice for the establishment of university chairs for our science.

We do not urge a socialization of medical history, neither do we expect that funds could be secured from the government for our purposes. Socialization of any scientific research may create second-rate and third-rate workers. Besides, subsidized research in this country is not truly appreciated, as J. E. Graf, the retiring president of the Washington Academy of Sciences pointed out; public support of research is always wavering, and a wave of magnanimity may be followed by a wave of rigid economy, sufficient to cripple any organized and subsidized research program.

Moreover, it is my conviction that to create an organization first, as many *ad hoc* government organizations do, and to recruit the men after-

wards to fill the positions on the organization's blueprint is a basically wrong procedure. After all, successful research of any kind depends not so much on the blueprint as upon the men engaged in it; they should be secured first. Foundations and government bureaus may plan, committees and consultant bodies may scheme, even the funds may be available, but if the wrong men are chosen, or the right men are put to the wrong job, the blueprint comes to nought. (Sir Thomas Lewis.)

Before offering you a suggestion to solve our multiple problems of recruitment, funds, organization, research and salvage of Old World medico-historical culture, let us recall the dual character of present-day medical research.

On one hand we have the experimental laboratory man who contributes a tremendous amount of information useful to medicine. On the other hand we have the clinician who has to be both a scientist and an artist of healing. If it is our objective to establish a union between the two by genetical analysis of the past, then such an analysis of our 20th century medicine is just as important for the integration of medicine as the analysis and synthesis of 16th or 17th century medical progress. Indeed, we are living in the era of rockets where historical events and discoveries follow each other so rapidly that our old-established measuring yard, still graded in units of years, decades and centuries, seems to be out of date and inadequate because much more is happening now in the field of science in a year than formerly in decades or centuries.

Interpreting the medical literature of today is, therefore, truly a task of a historically minded and trained physician. What the present-day research worker as well as the clinician needs is an intelligent guidance in, and an inspiring coordination of, the medical literature, not just a list of reference articles handed out to him. There is an inevitable gap between the mind of the two types of research workers, the laboratory man and the clinician, and neither one can afford the time nor can he have the training fully to understand the other. To bridge over the gap should be the task of the medical historian. Our science should cease to remain wholly in the past and intellectually isolated from the present. We should study and expound the history of medical sciences, not from the biographical and antiquarian standpoint, but with the definite motive of pointing out to medical researchers the ways in which problems were solved in the past, and by a critical analysis of the present we should guide them to the best sources and the most prolific and sound methods of work.

No doubt this is a huge order, since we live in an age in which ideas,

nomenclature, and methods in medicine are changing more rapidly than ever before; an age in which the profusion of facts and ideas, carried by a flood of new books and periodicals, results in a bewildering confusion, bewildering not only to the average man but to the research worker himself. Who could better orient himself in this flood of printed matter than the medical historian whose sources are chiefly printed, and whose research tools are books and reflective thinking? Here is a new field for him, a field of genetical understanding and correlation, neglected by both experimental and clinical medicine, a field which rightfully belongs to medical history.

Unfortunately, the integration of modern medical research, together with the conservation of our printed sources, was left in this country in the hand of deputies ignorant of medicine. Such a deputy, the librarian, cannot ever grasp the full opportunity to correlate the past with the present, or the literature of experiment with the literature of clinical observation. He is constantly struggling to translate medicine into basic English, and to keep his narrowly defined field of medicine in his preconceived pigeonholes of classes. But in medicine, classes are not immutable, while the terms change and our definitions vary as we work. These changes are not only inevitable but they constitute the adjustments and measure of medical progress. The latest, April 1946, issue of the *Bulletin of the Medical Library Association* testifies that the librarians themselves feel their inability to cope with medical research literature, and that the so-called reference librarians " cannot intelligently discuss the library materials written by medical specialists " (D. W. Friedrich).

The medical library is primarily an institution of medicine and for medicine; only secondarily is it a storehouse of books and skill or a place of employment for library-school graduates. As a medical research institution it should be a place well equipped with critical apparatus and other facilities for working by special medico-bibliographical and medico-historical methods. It should have an academic atmosphere of learning, and it should be a center of medical culture and humanism, where knowledge and information is distributed not in a service-station attitude of " say-me-when " (a phrase I borrowed from Jacques Barzun), but by a close and critical revision of present beliefs in every branch of experimental and clinical medicine. That is, however, what we may justly expect from the medical library as an institution of medicine. Since this function can never be performed by technicians or nurses of books, each medical library in this country, if it wants to be a true research library, should reorganize

itself by completely separating its storehouse library duties from its professional medical functions whether these are called bibliography (an incorrect term) or research (correct term but at present incorrectly applied in many libraries).

The direction of these segregated research functions of medical libraries should be delegated to medical historians, properly qualified and trained not only in the historical methods but also in medicine itself, and in the bibliographical technic, with wide encyclopedical knowledge of other sciences. The post of medical historian—or let him be called medical research specialist—should be a full-time post, since only that alone can ensure leisure for efficient study, and freedom from any distracting thought of another career.

He must be assured free and full access to the material he desires to study, and full freedom for the arrangement of that material. His routine duties could allow him time for personal study and reflection, to keep up broadly with progressive contemporary movements in all fields allied to medicine. He should organize and supervise research by trained assistants, and should coordinate his special studies with the needs of contemporary and local demands, and he should provide permanent contact between the library, the clinics and the laboratories of medicine.

By his special training and special knowledge of current and old medical literature, he will be able to change the character of the library into an institute of learning where young medical people could be taught to recognize sound sources of information, to develop passion for understanding, together with independence of thought and judgment. He should not be subordinate to the general library, and his research department should have its own independence.

Such a research department of the medical library will in any large university center stimulate both experimental and clinical medicine as well as instruction, and it will link the two heterogenous essential elements of medicine. For the library itself the presence of a permanent research division and a medical man on the staff would mean a great asset, not only for the more intelligent utilization of sources but also for the establishing of a tradition; and the right tradition is an invaluable asset for any institution of medicine.

For medical research, no doubt, the creation of such posts would fill a long desired need, especially now when all over the world there is a general feeling that the present facilities and means of libraries are inadequate for the promulgation of knowledge. For our own science and its

cultivation in this country, the establishment of these posts would result in vigorous growth, and a national organization in which, from a central institute, the even distribution of medico-historical research fields could be encouraged, not by direction and control of individual research, but by recommendation and upon a cooperative basis.

And what would such an arrangement mean for international science and for regeneration? The central institute could assume the role of an international organizing bureau and clearing house; it could become the coordinator or moderator of research in medical history for the whole world.

My proposition is such that it can be readily grafted on to the present system. When we can prove that our purpose is more than just the study of a couple of old books, that medical historical research can become as fundamental for medicine and as practical as the laboratory work on guinea pigs, and that we are honestly striving toward the ennoblement and enrichment of medicine, there cannot be much difficulty in obtaining funds for our purposes, once the beginning is made.

CONTRADICTIONS IN PRIMITIVE SURGERY

ERWIN H. ACKERKNECHT

I am offering some anthropological data at this meeting of historians because I am convinced that both sciences, history and anthropology, though using different methods and materials, deal with the same fundamental problems of human behavior—in our case, with human attitudes in relation to disease. Therefore, data taken from "savages" or "primitives" often provide valuable checks or confirmations for general conclusions reached on the basis of historical material. On the other hand, anthropologists can profit greatly from consulting historical data before they begin to generalize.

In this short paper I cannot offer evidence for my statements on the status of surgery among primitives. Those interested are referred to my comprehensive survey of primitive surgery which is to be published in the *American Anthropologist*. The results of my survey are the following:

All primitive tribes use some kind of wound treatment. The principles are always very similar: herbs or roots, often with astringent or disinfectant qualities, are applied to the wound in form of powders, infusions, or poultices. The results of this treatment are generally described as very good by ethnographers, travelers, and missionaries. It is difficult to assess such judgments, which are based exclusively on the actual healing of the wound, as this result might be explained just as well on the basis of a good constitution or the absence of the virulent strains of bacteria which we have cultivated for hundreds of years in our cities and hospitals. It is easier to form an opinion on certain isolated technical procedures, such as suturing techniques (with sinews among North American Indians, thorns among the African Masai and Akamba, or the heads of termites among the Somali and Brazilian Indians), or the stopping of bleeding. In the latter case, the most successful technique invented by primitives is cauterization.

Equally universal among primitives is the treatment of fractures and dislocations. Again the results of fracture treatment are excellent, and again judgment on this point is difficult. Dr. Adolph Schultz of Johns Hopkins has, in his studies on wild gibbons, found a high percentage of well-healed fractures, and certainly the gibbons did not enjoy the services of bone-setters. A great many primitives use splints, but otherwise treatment is more active. Massage of the broken limb starts early.

Though not used primarily in surgical diseases, bleeding is a surgical procedure itself. Bleeding is also of almost general use among primitives. We are apt to form a wrong picture of the technical excellence of primitive bleeding by identifying bloodletting with venesection. Actually only few primitives (mostly inhabitants of this hemisphere) practice venesection. The usual methods are much cruder, consisting of scarification, cupping with a horn over incisions, etc.

Not so widespread as the above-mentioned procedures, but still fairly frequent, are operations by incision—particularly the opening of boils and abscesses.

The foregoing sums up the general scope of primitive surgery. More complicated operations, such as amputation and excision, are extremely rare. Some Eskimos or Chippewas might occasionally chop off a frozen finger, but there is only one tribe, the East African Masai, that really amputates skillfully, enucleates eyes, sutures vessels, scarifies tonsils, etc. Southeast Africa generally seems to be a center of more-developed surgery. It is the only region from which Cesarean sections are on record. At least six writers have reported the excision of neck glands in the case of sleeping disease (trypanosomiasis). I have been able to find only one place outside of Africa where surgery reaches similar levels: Vaitupu in the Ellice Islands in Polynesia. There, subcutaneous lipomata, the elephantoid scrotum, tubercular glands in the neck, old leprous or yaw ulcers are removed successfully with shark teeth serving as knives.

The existence of these two widely separated geographic centers where primitives, quite contrary to the general attitude and without any particular social, technical, or environmental reasons, have developed a rather high type of surgery constitutes our first contradiction.

Things become still more complicated when we realize that one particular operation which demands considerable skill and has been regarded as especially dangerous in our civilization, at least during the last centuries, is practiced by numerous "savages" who otherwise limit their surgery to a little wound treatment, bone-setting, and bloodletting. I am speaking here of *trepanation,* the successful performance of which has been observed, for example, among the Berbers, in Abyssinia, Nigeria, Uganda, New Caledonia, New Zealand, New Guinea, the Solomons, Tahiti, and the Andean Highlands. This existence of a very complicated operation among tribes knowing otherwise only the rudiments of surgery constitutes a second, striking contradiction.

Finally, there are numerous tribes, particularly in the Americas,

Oceania, and Africa, which never open an abscess, not to speak of amputating a finger, for medical reasons, but do amputate and mutilate quite extensively fingers, toes, genitalia, etc. if their religious rites or ideas concerning punishment indicate such procedures. This is our third and, undoubtedly, most flagrant contradiction.

Theoretically there exist four possibilities to explain why primitive surgery in general is so poor:

1. Under primitive conditions, there is no need for a more developed surgery.
2. Primitives lack the technical skill necessary for better surgery.
3. They lack the knowledge of such basic factors as anesthesia, asepsis, or anatomy.
4. Their general orientation towards the supernatural is a deterrent from their developing a more systematic surgery.

Though cancer is relatively rare among primitives, there are enough pathological conditions left which would warrant a more elaborate surgery. Even primitives who show the highest technical skill in other fields, like the Eskimos, are very poor surgeons. Anesthetic and aseptic methods are better developed among primitives than is usually assumed; on the other hand, the Masai were able to do quite creditable surgery without knowing much about either anesthesia or asepsis.

It is true that anatomical knowlege is an essential condition for successful surgical action, and that the anatomical knowledge of primitives in general is very poor. It is significant that anatomical knowledge is so poor among primitives not because they lack opportunities to observe anatomical facts, but primarily because they are not orientated towards such observation. There are tribes in Africa, Asia, and Oceania which do perform numerous autopsies in the search for witchcraft principles and yet are, as I have shown, just as ignorant of the most elementary anatomical conditions as are the non-dissecting tribes. Looking for the supernatural, they just seem not to observe the natural and the obvious.

It is very likely that this supernaturalistic orientation, which goes far beyond the use of magic spells in wound and fracture treatment or in operations like trephining, explains also the contradictory fact why it never occurs to those who " amputate " so freely for ritual or judiciary reasons that these techniques could and should be used in medical situations. It also seems to explain why a highly complicated single operation arrived at through magico-religious rites, like trepanation or Cesarean section,

can coexist with an otherwise completely undeveloped surgery,—a phenomenon impossible in our culture where discoveries are made by logical scientific procedure.

It is obvious that amputation cannot develop in those numerous societies where any mutilation is outlawed for religious reasons, because the mutilation would be carried over into the much more important and lasting existence of the ghost.

Insight into the contradictions of primitive surgery might help us to understand numerous contradictions of our own medical past, where, in many respects, the factors governing discovery and ignorance were closer to those influential in primitive societies than they are to those existing now in the scientific sectors of our modern world.

FURTHER EVIDENCE THAT DENTISTRY WAS PRACTICED IN ANCIENT EGYPT, PHOENICIA AND GREECE

BERNHARD WOLF WEINBERGER

Fortunately we no longer are bound to content ourselves with simple suppositions, for well authenticated archaeological discoveries have put us in possession of irrefutable proof that the dental art was practiced at an early period in ancient Egypt, Phoenicia, Greece and Rome.

Part of this story was related at the Sixteenth Annual Meeting of this Association in 1940 (1). This morning there will be presented additional material that strengthens my previous contention that dentistry had its origin in Egypt and not, as so often stated, in Greece or in Phoenicia. It will also be necessary to move back the time some two thousand years from that now assigned to the earliest known examples of dental prosthesis.

Within the past year we have obtained three new specimens of ancient dental art, which will be shown, that are of primary importance in completing our jig-saw puzzle. The filling in of the vacant spaces enables one to see more clearly that instead of ancient Egypt not having dental practitioners and some idea of dentistry, it was she who passed her combined knowledge along to other Mediterranean people.

In two previous papers we endeavored to show from hieroglyphics on Egyptian tomb steles the titles of Egyptian medical men who specialized in dentistry from 3000 to 525 B. C., the earliest man of this kind being Hesi-Ré " Chief or Great One of the Toothers and the Physicians." (2, 3) There were others who were known as " Treater or Maker of Teeth." From this we are led to believe that dentistry itself was specialized. (Fig. 1 A & B.)

We also considered at that time the evidence of the practice of oral surgery in the form of a mandible of an individual as early as the 4th Dynasty (2900-2750 B. C.) (Fig. 2). (4) This specimen seems to establish beyond a reasonable doubt the existence of a rudimentary knowledge of such a practice in the Old Empire. The question no longer remains unanswered, did these Egyptian dental specialists practice prosthesis, a fact at which we hinted when quoting Junker: " Two teeth were ingeniously held together by gold wire; obviously one was a loose tooth which, by being fastened to its sound neighbor, was kept from falling out."

Fig. 1 A.

Fig. 1 B.

A. "Chief of the Toothers (dentist) and the Physicians," "Hesi-Ré." An Egyptian medical specialist of 3000 B.C. (J. E. Quibell, Pl. 32.)

B. "Neier-iret-es." About 2800 B.C. "A Treater or Maker of Teeth." (C. R. Lepius.)

FIG. 2.

Human mandible. 2900-2700 B. C. The two "borings" above the mental foramen are supposed to be the work of a "specialized" dental physician or surgeon. (Peabody Museum. Harvard Univ.)

FIG. 3.

Egyptian appliance found at Giza c. 2500 B. C. Earliest example of simple retentive prosthesis, gold wire woven around the gingival margins of the second and third lower left molars. (Junker, pl. 50A)

FIG. 4.

Phoenician simple retentive appliance for loose teeth, found at ancient Sidon. 4th Century B. C. (?) (Louvre, Paris)

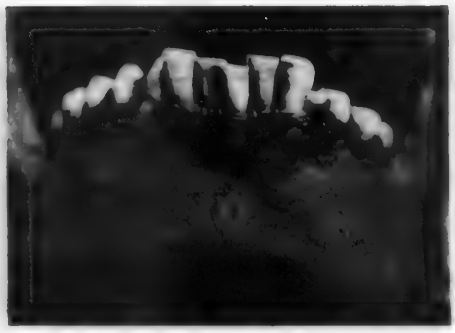

FIG. 5.

"Ford" retentive appliance of the 5th Century B. C., attributed to the Phoenicians. (M. D. Clawson)

FIG. 6.

Ancient Greek retentive appliance. 3rd or 4th Century B. C. (Guerini).

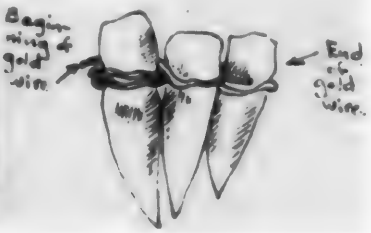

FIG. 7.

Drawing of the appliance found in a Roman grave of the 3rd Century B. C., near Alexandria. (Greco-Roman Museum of Alexandria).

It was not until 1929, when Junker completed the studies of his discoveries at Giza and published his findings (6), that he showed a photograph of these teeth, in a work we were unable to locate until last November. In writing up his discoveries in Shaft 984 (pages 256-258, Vol. 3) 4th Dynasty, Junker includes the detailed report on the teeth as made by Prof. Hermann Euler, Director of the Zahnärztlichen Universitätsinstitutes at Breslau, and on plate 50.A there is to be found the photograph of Fig. 3. It is strange that Euler failed to comment or mention this important piece of evidence in dental literature; for that reason it has escaped the attention of those interested in our history.

Three questions were apparently asked of Euler, to which he replied that he was positive that both teeth belonged to the same individual, judging by their color and anatomical form. One was the third lower left and the other the second lower left molars; that they were linked together by gold wire, woven around the gingival margin of the teeth. The crown of the third molar showed extreme wear with its roots absorbed. Because of some pathological condition this tooth became loose and had to be held in place by attaching it to its neighbor, the second molar, a method still in practice, he says, in present-day dentistry. As tartar was found on both the teeth and gold wire, this would indicate that the dental work was performed in the mouth of a living individual.

The illustration is not sufficiently clear for one to see whether the wire between the teeth is still intact, but from the quoted statement in Junker's preliminary report both were then held together by wire (5).

We now believe that there is sufficient authenticated evidence, (i. e. the actual names of dental specialists from 3000 B. C., to 525 B. C.; the mandible of the 4th Dynasty, perhaps even earlier, upon which a surgical operation had been performed; evidence of dental diseases and therapeutic treatment dating back to the 3rd Dynasty, and at last a specimen of actual dental prosthesis, done around 2500 B. C.) to say definitely that dentistry had its origin in Egypt as an independent specialty of medicine.

As Ranke has pointed out (7) with Egyptian surgery and medicine, the same thing happened with Egyptian dentistry. For some unknown reason this advanced development of dentistry suddenly stopped, and what had been built up during the course of several millenniums eventually was destroyed. Retentive dental prosthesis was not entirely lost, however, for we find that this knowledge was passed along to other Mediterranean peoples with whom Egypt maintained commercial intercourse, especially Phoenicia, Greece and Etruria.

Time will not permit a consideration of the remarkably advanced knowledge of the Etruscans and the many known interesting examples of their bridgework, made during the 6th Century B. C. (8) However, I do want to show some specimens of simple retentive prosthesis, for they supply the answer as to whether the Egyptians practiced any form of dentistry around the Christian Era.

Until now we have had only the Gaillardot appliance, (9) found at ancient Sidon and now in the Louvre, as an example of Phoenician dental art of the 4th Century B. C. Fig. 4 shows the six lower anterior teeth united together with gold wire, two of the incisors appear to have belonged to another individual and to have been applied as substitutes for lost teeth. Mention must be made of a quantity of small objects found in the same grave with the fragment of the mandible, such as "two copper coins, an iron ring, a vase of most graceful outlines, a scarab and twelve very small statuettes of majolica representing Egyptian deities. . . ." Guerini has remarked "that if there were dentists in Sidon capable of applying false teeth, it may reasonably be admitted that the dentists of the great Egyptian metropoli Thebes and Memphis were able to do as much and more." (10)

Another example of Phoenician dentistry heretofore not known to American historians although described by Torrey (11) and Clawson (12), is shown in Fig. 5, discovered in 1901 by the American School of Oriental Research of Jerusalem approximately a mile southeast of the City of Saida or ancient Sidon and just in full view of the necropolis from which Fig. 4 was taken. The dental appliance now on display in the Museum of Archaeology in Beiruth and known as the Ford mandible can for archaeological reasons be dated with fair accuracy to the 5th Century B. C.

According to Clawson (12) the appliance was "an attempt to keep diseased teeth in the mouth by retentive prosthesis, and not an attempt to replace lost dental organs" as is very evidently the purpose of the previous described and Etruscan specimens. Because of this he reasons that it is the older of the two, as the bridging in of lost teeth shows a more highly developed dental art. This line of reasoning does not take into account the earlier dental art of the Etruscan, where we find appliances for the replacement of teeth being used repeatedly.

As both of these so-called Phoenician appliances were found within a mile of each other and both show the same ingenious weaving around and firmly binding together of anterior teeth, entirely different from the two Grecian that will be considered later, it would appear that they were made by the same group of individuals or even the same individual and that the time assigned for the one in Fig. 5 is incorrect.

Along with the skeletal remains there again were buried valuable objects similar in nature to those found with the other Phoenician specimen, "a gold finger ring, and twelve small statuettes of Egyptian faience representing Egyptian deities pierced for stringing." As in many Phoenician tombs the objects discovered showed the influence exercised by the Egyptian civilization on the life and customs of the Phoenicians, for that reason we no longer have reason to doubt that this same influence was felt in their dental art. Again we have no way of knowing whether these appliances might not have been made by Egyptians instead of by Phoenicians.

The two so-called Grecian appliances that have come down to us make it difficult to say if they represent the type of simple retentive prosthesis being practiced in Greece at that time. When compared with Figs. 4 and 5 they are crude and afford us little reason to believe they were of much assistance in retaining loose teeth. Fig. 6 is a specimen in the National Museum at Athens of the 3rd Century B. C.

Fig. 7, presented here for the first time and now in the Greco-Roman Museum of Alexandria, belongs also the Ptolemaic Period (300 B. C.). It was discovered in a Roman grave at Ibrahimia near Alexandria, Egypt. From Dr. L. Avrouskine of Alexandria I have the following information: "The natural teeth, lower right central, lateral and cuspid, were held together with a gold wire. The Teeth present an abrasion around their necks due undoubtedly to the mechanical action of the gold wire. The teeth are worn and over-calcified and I found also the presence of tartar going half way down the roots."

Fig. 8 is a drawing "made by an expert to give a better idea of the appliance." The photographs sent, being small and out of focus, cannot be shown. They are the evidence we needed, however, to prove that dental prosthesis was known in Ancient Egypt.

Conclusions

While tradition has it that in ancient Egypt a dental art was unknown, well authenticated archaeological discoveries have now put us in possession of irrefutable proof that dentistry was highly specialized and that it was a specialized branch of medicine.

To the actual names of Egyptian dental specialists, the mandible of the 4th Dynasty upon which a surgical operation had been performed, and to those medical papyri mentioning dental disease and therapeutic treatment, we now are able to include another phase of dental practice, simple retentive prosthesis. The specimen supplied us the proof so badly needed to

complete the picture that dentistry had its origin in Egypt and as an independent specialty of medicine.

Until now the numerous specimens of Etruscan dental art of the 7th Century B. C., were thought to be the oldest known examples of dental prosthesis. With the finding of the specimen by Junker it therefore becomes necessary to move back the time some two thousand years from that now given for that type of dentistry.

The finding of another crude appliance, similar in construction to the one we now call Greek dentistry and found in a Roman grave in Egypt, has furnished additional proof that dentistry was known and perhaps even practiced in Egypt as early as the 4th Century B. C.

Superior to the so-called Greek appliances are two examples of Phoenician dentistry, both found within a mile of each other in ancient Sidon. Along with the skeletal remains there were found many valuable objects, already described, that showed the influence exercised by the Egyptian civilization on the life and customs of the Phoenicians. For that reason we no longer doubt that this same influence made itself felt in their dental art, and instead of ancient Egypt not having dental practitioners and some idea of dentistry it was she who passed her combined knowledge along to other Mediterranean people.

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CURIOSITIES OF JEWISH MEDICINE

BENJAMIN L. GORDON

It is now generally accepted that medical science, like all human knowledge, developed gradually by a process of evolution and that no single personality or nation has a monopoly on its invention. The Egyptian papyri are but a compilation of earlier works, dating back to the time of the pyramids, 2700 years B. C., and these again date back to still greater antiquity. The Corpus Hippocraticum is an outgrowth of the works of Anaximander, Anaximenes, Alcmaeon, Empedocles, Pythagoras and others. Homer alludes to the influence of Egypt upon the medical concepts of his day by saying:

> From Paeeon sprung their patron-god imparts,
> To all the pharian race his healing arts.[1]

The ancient concept that science and art are transmitted *in toto* from generation to generation was based on the fact that man had no confidence in his ability to investigate hidden natural phenomena and consequently an understanding of such science and art was unattainable except through divine revelation. Thus, the Egyptians had their Thoths and Imhoteps as patron saints of medicine. The Persians had their Thrita, to whom the great Ahura-Mazda presented herbs and an operating knife. The Greeks had their Apollo and Aesculapius as their gods and patron saints of medicine. The ancient Hebrews, being a monotheistic people (and having no saints), according to one legend, considered the mystical Enoch [2] as the founder of medicine.

Bar Hebraeus (1226-1286 A. D.), known by his Arabic name, Abulfaraj, the son of a Jewish physician who became a Jacobite Syrian bishop, in his chronicon entitled *Makhtaba Hauuth Zabhna* (a history of the world from the creation down to his own day) relates the following strange account of the origin and transmission of the medical art: The Egyptian Hermes, he declares, is no other than Enoch, the son of Seth. Enoch was the teacher of Aesculapius, the patron god of Greek medicine. The Greek Hermes, he states, received his medical knowledge from Agathodameon (a guardian spirit, saluted by the Greeks after libation) whom he identified with Seth, the son of Adam. He thus traces the origin of medicine to the first man.

[1] *Odyssey*, Book 4, 1, pp. 320-325.

[2] Gen. 5:24.

Another legend with reference to the origin of medicine is found in the Book of Jubilee.[3] It is related that the angel Raphael, taught Noah how to cure disease and pointed out to him the plants, herbs and drugs to be used in sickness, which Noah recorded in a book which was transmitted from generation to generation. Later, according to this tale, this book was translated in many languages, copies of which fell into the hands of famous physicians of India and Greece who derived therefrom their medical knowledge. The book became known as *Sefer Noah* (Book of Noah).[4]

Artapanus, in his history of the Jews, identifies Moses (1200 B. C.) with the Egyptian god, Thoth. According to the New Testament,[5] "Moses" (who was brought up in the house of Pharoah) "was learned in all the wisdom of the Egyptians." It will be recalled that medicine was highly developed in Egypt at that period.

Philo, the Alexandrian Jewish philosopher (20 B. C.-40 A. D.) presented a similar traditional thesis that "Moses was educated in the fashion of the Egyptians and Chaldeans."

At the beginning of the third century (A. D. 160-250) Clement of Alexandria states that Moses learned medicine and alchemy under the tutelage of Egyptian physicians.[6]

There are no ancient Hebrew medical books extant whose authorship is definitely known. The book, *Sifra de-Ashmedea*, credited to King Solomon but probably of much later origin, is mentioned in the Kabalistic *Zohar*. This book is known under various titles and contains magical formulae for casting out demons from the sick. Josephus states that Solomon was endowed with the power to cast out demons by incantations. Josephus saw the pious Eleazar drive out a demon in the presence of Vespasian by burning a plant known as "baarat" in conjunction with the reciting of magic formulae allegedly composed by Solomon.

This book, *Sifra de-Ashmedea* may be identified with the Hebrew work *Mafteah Shlomoh* (Clavicula Solomonis) that is extant in Latin, French, Italian and German translations and consists of two parts, the first of which contains secret cures for every kind of demonic possession. The *Mafteah* is mentioned by a 17th century author, Gedalyah Ibn Yahya.[7]

[3] Ch. 10, 1:4.
[4] Jubilee, Heb. trans., Rubin, Ch. 10, 1:14.
[5] Acts 7:22.
[6] Lib. 1:419.
[7] Shalshalet ha Kabalah, p. 80, Amsterdam 1697 as extant in Hebrew.

In the Latin translation of the *Clavicula Solomonis* there is a long introduction consisting of a dialogue between Solomon and his son, Reheboam. This work is also known as *Secreta Secretum*. In the superscript Solomon says: " I named it ' Clavicula ' because like a key which opens a treasure, so this work introduces thee into the medical art."

There is another medical work accredited to Solomon and known as *Sefer Refuoth* (Book of Medicine). This book is quoted from time to time by various ancient writers. Joseph refers several times to the *Sefer Refuoth*.[8] Nahmanides, in the introduction to his commentary on the Pentateuch, refers to this work as having been written by Solomon. The *Sefer Refuoth* is possibly identical with *Kitab al-yahud* mentioned by D'Heerbelot in his Bibliothèque Orientale.

The author of *Kerem Hemed* [9] states that the Armenians and Abyssinians still believe in the tradition that Solomon was the founder of medical knowledge.

It is likely that the *Sefer Refuoth* referred to above, is identical with the *Sefer harefuoth* mentioned in the Talmud which King Hezekijah (726-697 B. C.) concealed (possibly because human healing occupied an important place in this book).

Abraham Jaegel [10] relates that in his time, during the 9th century A. D., there came to Pope Clement VIII in Rome, an envoy from the King of Armenia, who disparaged the European physicians, declaring that in his own country they used medical works left to them by Solomon, which were more nearly complete and more systematic than the European works. Jaegel ventured the opinion that it was quite possible that the Armenians actually possessed medical works left by Solomon, inasmuch as they were constantly in one location whereas the Jews, being driven from one country to another, would be likely to lose such documents.

The story of the Armenian ambassador may truly reflect the high standard of medicine in his country at that period, but it is questionable if Solomon's medical treatise was actually in Armenian hands. It is more likely that the textbook the Armenians consulted was the *Sefer Asaf* also known as *Sefer Refuoth*—the oldest medical manuscript still extant in the Hebrew language. Copies of this manuscript are found in principle libraries of Europe. The contents of these manuscripts vary in minor

[8] Ant. Jud. 1:8.
[9] Kerem Hemed 2:41.
[10] Abraham ben Henajah, Italian philosopher and Kabalist, 16th and 17th cent. A. D. See also Keneseth Furst, Biblical Jud. vol. 2, p. 10 and Kenseth Yisrael by Feunn, p. 29.

detail, but in main, they all contain treatises on physiology, embryology, diseases of various organs, hygiene, medicinal plants, antidotes for various poisons, and urinology. This work also treats of the four periods of man's life and the four winds as these factors relate to disease. It contains aphorisms and passages which somewhat resemble the Hippocratic oath. According to Steinschneider, the aphorisms have the earmarks of those of Hippocrates and the medicinal plants referred to, bear a resemblance to those described by Dioscorides. Steinschneider believes that Asaf was influenced by Galen. Others think that the *Sefer Asaf* may be identified with the aforementioned *Sefer ha Refuoth* of the Talmud, referred to above.

The Munich manuscript is the most complete. It contains 396 pages. The human body is described as being composed of four elements. It deals with the blood, bones, brain, gall, heart, kidney, liver and spleen, and with diseases of these organs. Embryology occupies an important place. It mentions climatic diseases. The etiology of disease is ascribed to unbalance of the four humors. The significance of the pulse, urine and fever in various diseases is discussed and prognosis finds a prominent place in this book. Antidotes to various poisons are listed. One hundred and twenty-three different herbs are mentioned. In other manuscripts the names of drugs are given in four different languages and their therapeutic uses are noted.

The Munich manuscript cites two authorities, *The Book of Wisdom of India* and *A Book of the Ancients*. The latter work may be the Corpus Hippocraticum.

The scribe, credits the authorship of this work to Shem, the son of Noah, who received it from the angel, Raphael.

The Oxford Manuscript names such authorities as Mar Mor, a Christian of Salerno; Mar Joseph, a physician; Rudolph, a physician of Worms, and Samuel the physician. According to the names cited, the authorship of the book was as late as the 13th century A. D.

The author's name varies in the various manuscripts: He is known as "Asaf ha-Yehudi" (Asaf, the Jew), "Asaf ha Rofe" (Asaf the Physician), and "Asaf he-Hakam" (Asaf, the Wise). In the Bodleian manuscript the author is called Johanan ha-Jerchoni, which, according to Fürst, indicates that he was a native of Jericho. In another place, in the same manuscript, he is referred to as Judah ha-Jerchoni and in a still later section he is called Samual Yarhinai. The last name evidently refers to the famous physician and astronomer, Mar Samuel (2nd century A. D.) cited

frequently in the Talmud. The same manuscript mentions a Johannan ben Zabda as the author.

In the Paris manuscript (no. 11,977) the author is named Asaf ben Berechiah ha-Yarhoni (Asaf, the Astronomer), because of the similarity of that name to one of the captive Levites carried off to Assyria (Tehron, 6:24, v. 39). The Sefer Asaf has also been ascribed to ben Berechiah al-Nadim (Kitab al-Fihrist 1:19).[11]

Neubauer[12] thought that Asaf was a Christian physician of the 11th century who wrote the book originally in Arabic, which was eventually translated into Hebrew, but the fact that the book of Asaf is quoted two centuries earlier by the Italian physician and astrologist, Donolo (913-982) shows that Asaf's book was written before the 10th century.[13]

Incidentally, Donolo was a prominent Jewish physician of Italy who studied philosophy and astronomy in the Greek, Arabic, Babylonian and Indian schools. He later turned to medicine where he studied under the tutorship of an Arab physician from Baghdad where he subsequently practiced medicine for a brief period. His work, *Sefer ha-Yakar* (precious book), was published by Steinschneider in 1867 from a Hebrew manuscript in the library of Florence. This work contains practical directions for administering and preparing medicine from roots, and also has an antidotarium. This work is based upon Greek and Roman sources. He is mentioned by the many famous commentators of the Bible.

Rappaport is of the opinion that the name, Asaf, may be a corruption of Aesop or Aesculapius and that the author used these names to attract readers. *Sefer Asaf*, according to Rappaport, might have been written by Donolo or Isaac Israeli. The fact that technical terms abound in Hebrew, Armenian, Persian, Greek and Latin lead some to believe that the book was written in northern Syria or Mesopotamia where all these languages were spoken. Notwithstanding, however, the reference to the late names in the manuscript, the general opinion is that *Sefer Asaf* was written in the period between Hippocrates and Dioscorides.

[11] Yellinik (B. H. vol. 23) states that Asaf was a Vezir to King Solomon.
[12] Orient and Occident 2:159-163.
[13] See Louis Ginzberg, *Jewish Encyclopedia* II 162.

PSEUDO-PLINIAN MEDICINE

ARTURO CASTIGLIONI

The story of Plinian or Pseudo-Plinian medicine has been exhaustively discussed by many authors. The book which appeared under his name was first edited by Pighinucci and printed in Rome in 1509 by Stephanus Guilliretus Lothoringius with the title *C. Plinii Secundi Medicinae libri quinque*. The publisher asserted that it was a work which had never been printed before and was very little known. The privilege by Pope Julius II was dated July 9, 1509. According to Rose, the text seems to have been taken from a codex which he had examined and exhaustively described, and it may be dated in the fourth century. It contains many errors, and only the first three books are based on the *Historia Naturalis* of Pliny. Paolo Giovio, the well-known Italian historian, attributed the authorship of the book to a physician, Plinius Valerianus, of whose life nothing is known. The fact that a tomb inscription bears the name of this physician, who was born in Como in the 2nd century and died at 22 years of age, seemed to be sufficient reason for attributing the authorship to him. E. H. F. Meyer in his excellent *Geschichte der Botanik* (Vol. 2) has exhaustively examined this work. He and all the authors who devoted their attention to the subject quote a second edition, which was published by Albanus Torinus (Alban Thorer), Professor of Medicine at Basle, and printed by Andreas Cratander in August 1528. We shall discuss this edition later. But an interesting fact which, it seems to me, should be brought to the attention of those who are versed in the history of Latin medical literature, is that there exists a second edition of a book of Plinian medicine, with a different title: *Aureum opus et sublime ad medellam non parvum utile—Plinii philosophi et medici integerrimi—nonnullaque opuscula videlicet Johannis Almenar: Nicolai Leoniceni interpretis fidelissimi ambobus De morbo gallico—Angeli Bolognini De cura ulcerum exteriorum—Alexandri Benedicti de peste—et Dominici Arcignanei de ponderibus et mensuris super inventis ad praxim quam maxime necessarii*. This book was published in 1516 in Bologna by the well-known printer, Hyeronimus de Benedicti; a copy in the British Museum brings in the colophon the date of Pavia, 1516 and the name of Bernardinus Guaraldi as printer. As indicated on the title page, the volume contains five other medical treatises. The book on syphilis by Juan de Almenar had first been

published in 1502; the treatise on syphilis by Leoniceno was published for the first time in 1497 and was reproduced in facsimile by Sudhoff (edited by Singer, Florence 1925); the treatise by Angelo Bolognini was first published in 1506; that by Alexander Benedetti on plague in 1493; and a treatise on weights and measures by Domenicus Massaria (erroneously indicated as Arcignaneus on the title page) in 1516.

In the introduction to his book, Leoniceno apologizes again for his attacks on Pliny which had originated the unpleasant controversy (*Plinii et aliorum auctorum, qui de simplicibus medicaminibus scripserunt, errores notati*, Ferrara 1492). This passage, which was printed in a different form in the first edition, was omitted in the second and third editions (Milan 1497 and Leipzig 1497) and appears here again.

This edition of Bologna 1516 containing the Plinian medicine and the book of Leoniceno is very little known. It is quoted only by Kristeller in *Bibliographica*, London 1894, who said that only two copies of it were extant in the British Museum and one in the National Library of Florence. Neither Valentine Rose, nor Meyer in his *Geschichte der Botanik*, nor Choulant, Haeser, Sprengel, Thorndike, nor Sudhoff in his book on the early printed literature on syphilis (edited by C. Singer, Florence 1925) refers to this edition, of which the Library of the New York Academy of Medicine possesses a beautiful copy. The book is remarkable also from the typographical point of view. On the title page there is a woodcut representing a surgeon examining a patient, surrounded by three students. P. Kristeller (*Die Lombardische Graphik der Renaissance*) finds that this woodcut stems from an independent group of woodcuts in Pavia, quite different from the Milanese engravings and those of other parts of Italy, but in close relation with Ferrara.

The most interesting fact for the history of Plinian medicine is that this edition is quite different from the first of 1509, and also from the so-called second, but really third, edition of Basle 1528. Some chapters of the Bologna edition are entirely omitted in the third, and the whole disposition of the treatise and of the book is different. Reading through the two editions and comparing them, one with another, one must have the impression that the original of the second one was written by somebody who had taken less regard for Pliny and had inserted some new items. It seems that the compilator of this edition may have been a physician, or at least took into consideration some books on medicine of classical times. For instance, in the first book on diseases of the head which, in the third and later editions, deals exclusively with diseases of the head and their

aureum opus ⁊ ſublime ad medellã non parum vtile
Plinij philoſophi ⁊ medici itegerrimi. nõnullaq3
opuſcula videlicet Joãnis Almenar: Nicolai
Leoniceni iterpretis fideliſſimi ambobus:
De morbo gallico vt vulgo dicitur: An
geli Bolognini ꝺ cura vlcerũ exterio
rum: Alexãdri Benedicti de peſte:
⁊ Dominici Arcignanei de põ
deribus ⁊ mẽſuris nuper
inuẽti ad praxim quã/
maxie neceſſarij
feliciter in/
Cum gratia cipiunt. ⁊ Priuilegio.

✠

therapy, there are inserted some chapters on insania, on phrenitis, on lethargia; then there is a long discussion on different diseases of the ear and of the throat with some clinical observations which show a certain practical experience and are surely not taken from Pliny. Also, in the book on diseases of the lung, a part of which is reproduced verbatim in the third edition, there are some chapters on coughing and spitting of blood which are not to be found in the later edition.

In general, we may say that the 1516 edition, which evidently was also very little known in ancient times, is different from the first of 1509 and from the third of 1528. It is furthermore announced by the publisher with a different title, *De Medella*, meaning in the low Latinity medicine as a remedy and not as an art or science. It may be that the publisher of this edition who calls Pliny on the title page "the very famous and honest *physician*, Cajus Plinius Secundus," wishes to present a new book independent from the first, to which he never refers. And it may be interesting to note that Leoniceno, who was still alive and very active at the time when this book was published, may in all probability have seen the text and approved its publication. It appears very strange that the great Ferrarese physician and scholar, who had attentively studied the work of Pliny and suggested so many corrections to it and had originated the famous controversy with Collenuccio, Barbero and others, never took notice of this Plinian medicine. This may be taken as proof that even at his time the authenticity of the book was not accepted. How can it be explained, however, that a humanist and a scholar agreed to have his book on syphilis published in the same volume in which the Plinian medicine was printed and the assertion of its authenticity was sustained?

The third edition (1528) published by Torinus (Alban Thorer, 1489-1550) in a beautiful volume which also contains other treatises, i. e. the *Ars Medendi* of Soranus, a fragment on Dietetics of Oribasius, a book on the virtues of herbs by Lucius Apulejus Madaurensis (the Pseudo-Apuleius), and the book on Betonica by Antonius Musa, is also typographically a remarkable book. On the title page and around the initials there are woodcuts by J. F. (Johann Faber) after designs of Holbein. The preface of the book, in which the author addresses himself to the common people and affirms that he has felt the necessity to collect a breviary of the most important remedies, is identical with the one printed in the second (1516) edition. I quote some passages: "I had often opportunity to see the frauds of physicians, who sell for high prices few useful remedies and often are unable to cure the patient, being guided only by

the desire for their own profit. I often had seen that they prolonged diseases which could have been healed in some hours, and in this way, originated serious diseases in order to earn more money. Therefore, I deem it ncessary to collect in a breviary the most important prescriptions so that one may be able to use them without calling for the help of those people." Then follows a short preliminary list of popular remedies: oleum vetus, salted water, oxymel honey, collyrium and some others. Finally the preface gives some short indications on dietetic measures.

The editor of this book affirms already in the title that it originates from a very old manuscript of Pliny, which he is publishing with some corrections. It appears, however, that the greatest number of mistakes are not corrected at all, and Kühn (*Opuscula academica* II) gives this work a very severe judgment.

The question now arises who was in fact the author of this book which had a certain success, because it was reprinted almost literally in the edition of the *Medici Antiqui* (Venice, Aldus, 1547) and later in Basle in 1546 (Choulant quotes an edition of Strasbourg 1536 which I was not able to find). The problem of the origin of the Medicina Pliniana has been studied very accurately by Valentine Rose (*Hermes*, Vol. 8, 1874), by Meyer, Thorndike and many others. The first two have given an accurate examination of the text.

The hypothesis that the book may have been written by Plinius Valerianus, who is not referred to either in the first or in the later editions, is absolutely inconsistent. This attribution originated with the well-known historian Paolo Giovio, who was the first to discover the funeral inscription and to draw the conclusion that the Plinius Valerianus named in it may have been the author of the book. Giovio argued that, since Marcellus Empiricus, whose quotations are extremely inaccurate, speaks of two Plinys, Plinius Valerianus (born in Como) may have belonged to the same family. But many reasons, first the fact that Valerianus died very young without, therefore, having had the possibility of taking many journeys of which the Preface speaks, contradict this belief.

Guentz supposed that the author might have been Marcellus Empiricus (4th century). Valentine Rose (*Hermes*, Vol. 8, Berlin, 1874, pp. 18-66) quotes the manuscripts which are still extant and which he has accurately examined, comparing them with the 1509 and the 1528 edition, in order to ascertain the origin of the text, which he attributed partly to Gargilius Martialis, partly to Marcellus Empiricus. There are many other manuscripts preserved under different names in European libraries: the most

important of them in Copenhagen. The judgment of Rose is that there are many different codices of different origins containing excerpts from different authors, dating from the 6th-9th centuries. The best known among them is the one published in 1509 which dates from the 9th century, which together with the codex of St. Gall 751, and the Codex of Karlsruhe, CXX, brings another contribution to the interesting story of the period of transition from Antiquity to the Middle Ages, during which a large number of works of this kind were written. Rose has published the whole index of the so-called *Breviarium Plinii*, and believes that the editor of the Plinius of 1509 followed a good manuscript. The discussion on the different attributions of one or another of the books of this collection is very diligently exhibited in Rose's work, which from the point of view of the origin of the Plinian medicine surely gives the most exhaustive information. The 1516 edition, however, was unknown to him.

Summarizing, we may say that the edition of 1516 which has never been described, as far as I know, up to the present time is essentially different from the first of 1509 and that of Basle 1528 of which all the later editions are the exact reproduction. It proves, therefore, that we have to do with at least two different compilators, or maybe three compilators, who copied from different authors. I believe, however, that we cannot be wrong in assuming that the compilator of the second edition (1516) may have been a physician of a certain experience, or at least may have consulted not only the works of the botanists and the herbalists, but also those of medical authors.

THE CASE OF SMALLPOX OF THEODORUS PRODROMUS (XIIth Cent. A. D.)

PAN. S. CODELLAS

Searching for the beginning of things especially pertaining to the state of human knowledge or of civilization in general we turn to the ancient civilizations. The same impetus and logical search for the origin of smallpox prompts us to the records of nations of the past. To form a solid opinion in this field there is needed a new critical study of the data at our disposal. The same applies to the sources of Western Europe, so that historians of nosology may be able to form opinions of the time and place of the appearance of smallpox. With better and more reliable records Greece commands our attention. Several investigators interested in the past history of smallpox, especially in the Greek and Roman period, with arduous zeal and indomitable ambition delve into medical and nonmedical literature of this epoch and strenuously labouring attempt to show they have proven this distemper was familiar then. They usually draw and support the whole picture on a single word or symptom, "anthrakes," "ionthos," "herpes," "erysipelas," "nomai," "phlegmone," "phlyctenai," "erythema," in Latin mostly "incendium," and other similar words. These terms have been repeatedly defined and plainly explained by the original authors in their texts or their immediate and later commentators. It is true they may suggest, but, to say the least, they do not plausibly support to the affirmative the author's thesis. With assenting voice the statement of John Freind [1] is appended herewith: "This was a distemper (smallpox) without dispute unknown to the Greeks, whatever some of the moderns have said to the contrary. . . . and first observed in this nation (Arabs) and described by the Mohammedans." The celebrated physicians and excellent scholars Richard Mead, William Alexander Greenhill,[2] Moore,[3] Rolleston [3a] and others agree with Freind. They all are well acquainted with Arabian medicine and some of them very good Arabists

[1] John Freind, *History of Physick*, London 1726, vol. ii, 188.

[2] William Alexander Greenhill, *A Treatise on the Smallpox and Measles by Abu Becr Mohammed Ibn Zachariya Ar-Razi (commonly known as Rhazes)*. Translated from the original Arabic by William Alexander Greenhill. London 1848.

[3] James Moore, *History of Smallpox*, London 1815.

[3a] J. D. Rolleston, *The History of Acute Exanthemata*. London 1937.

and Hellenists as well. This opinion prevails in elder and recent treatises of the history of smallpox, although sometimes a voice is raised to the contrary. Rhazes [2] statement that Galen knew smallpox is not correct nor accepted any longer after a search of the supposedly alluded to passages. There is no definite evidence that there is in the Galenic writings a term corresponding to *gadarī*, the Arabic term for smallpox. The Galenic term supposed to have been rendered into the Arabic as smallpox cannot he even guessed with forced meaning. In the Arabic and the Latin and English translations the looseness in the use of the terms is apparent. The Greek translator calls the disease with generic names without differential points: The Pustular Pestilence of the One Kind and the Other, the Light and Dense, meaning what we know as smallpox and measles. The Greek medical compilators of Byzantine times give no hint of the disease. Paulus of Ægina [4] (latter half of the seventh century), had visited Alexandria, and was supposed to have covered almost completely the medical knowledge of his time, but there is no suspicion of smallpox being known to the Byzantines. Theophanes Nonnus [5] (Xth cent.) wrote a compendious medical treatise by order of the Emperor Constantinus Porphyrogennetus (912-959) and in his preface states that he " selected and compiled all the important theories in medicine and diseases with their causes and treatment." He does not mention anything resembling smallpox. Such a disease of arresting medical characteristics, devastating results and national importance surely deserved mention and ought to have been in the Epitome. Aaron,[6] presbyter, living in Alexandria during the reign of Heracleius (610-641), wrote in Greek a medical treatise, the *Pandectai*, which was translated into Syrian. Rhazes quotes him frequently. He is reported as the first medical writer that described smallpox. Fragments only remain, especially on treatment. Constantinus Africanus [7] (born 1020, died 1087) bears the distinction in our topic of specifically having used the word *variola* exclusively for smallpox. In the past there had been a careless or loose use of the term. Under the name of *Synesius* [8] we have a Greek treatise " On Fevers," which was published in 1749 with the title *De*

[4] Paul of Aegina, *De Re Medica Libri Septem*, Second Book [Paris], 1567.

[5] Theophanes Nonnus, *De Omnium Particularium Morborum Curatione sic ut Febres . . .* etc. per Hieremiam Martium, Argentiorati 1568.

[6] Donald Campbell. *Arabian Medicine and its Influence on the Middle Ages*, Vol. I. London 1926.

[7] Constantinus Africanus, quoted from *Glossarium Mediae at Infimae Latinitatis* conditum a Carolo Dufresne Domino Du Cange, Tomus sextus, Parisiis 1846, s. v. Variola.

[8] Synesius, *De Febribus*, Jo. Steph. Barnard, Amstelodami et Lugduni Batavorum 1749.

Febribus. It is believed to be the earliest Greek medical work containing a distinct account of smallpox and measles. On the whole it agrees very nearly with Rhazes. After a very close and careful study and comparison in the identification of the author, Greenhill [9] concluded that this work " is part of the Viaticus of Constantinus Africanus, there can be no doubt." In Latin the heading of the IXth chapter is " De Variolis atque Morbilis." Greenhill calls the author Pseudo-Synesius. The appearance of smallpox and Mohammed come about the same time. There is a Greek translation of the classic treatise of Rhazes on Smallpox, which was rendered into Latin by Georgius Valla (Venice 1498; Paris 1548). At the end of the work of Alexander of Tralles edited by Goupyl [10] is added this Greek translation, which erroneously was attributed to Alexander. The Latin translation acquainted the western Europeans with this disease. Information about the translator is lacking. In Paris there is a manuscript (No. 2228) bearing the name of John Actuarius. The translation into Greek from Syrian was made by order of the Emperor, who is not named nor the year mentioned. Fabricius [11] believes that the Emperor is Constantinus Doukas (1059-67), but this cannot be sustained. It appears that it should be Andronicus II Palaeologus (1281-1328), because this period is of such a nature, spirit and state of learning that a work of this type can be expected. This is the renaissance of the Palaeologi, while the other period has no evidence of activity towards such a direction. With this in mind I am inclined to believe John Actuarius can raise a claim to the authorship of this translation. Actuarius flourished in the first part of the XIVth century, during the reign of Andronicus II and III and was named Actuarius. Language is no reason to deny him the paternity of the work. The above-mentioned are all the Greek writings that should have some word about smallpox and directly or indirectly inform us. There is nothing definite signifying smallpox in the Greek literature up to this time except for the presented case of this communication.

This prompts and puts forth the claim of Prodromos' own case of smallpox to be the first, at least, the earliest clear, complete and undisputed description of this malady in Europe, or rather the *Southeastern* part, in a European language during the last quarter of the XIIth century, the Comnenian period. The author without doubt is Theodore Prodromos.

[9] William Alexander Greenhill, Article in *Dictionary of Greek and Roman Biography and Mythology*, s. v. Synesius, vol. iii, London 1902.

[10] Alexander of Tralles, ed. J. Goupyl, Paris, 1548.

[11] Fabricius, *Bibliotheca Graeca*, vol. xii, p. 692, Ed. vet.

Nobody doubts his letters. Prodromos was familiar with medicine, as a pupil of Michael Italus. He was well acquainted in the Imperial Court. If the Greek translation of Rhazes was ordered by an Emperor of the proposed early date, Theodore would had known about the disease and the same could not have been a puzzle to laity and doctors as well. There is no hint of the disease being known in Byzantium, on the contrary, the ignorance of the medical profession concerning the pestilence is stressed. There is no allusion to any author in a period, which is known for having produced Synoptic works in all fields of knowledge. Some historians pretend that the disease was known but that the books are lost. In this case then some glimpse should be perceptible somewhere. The origin and endemicity must be looked for in Arabia. The numerous writers of that nation are a supporting factor. Rhazes composed his treatise to please the high philanthropic feelings of one of his hosts, not a medical man. This shows that the disease was known and widely prevalent, so as to have aroused the tender sentiments of this high personage with a public spirited mind. From the seventh century on the disease invaded new territories and followed the faithful of the Koran. The conquest after the seventh century spread over Egypt, Syria, Palestine and Persia, the Asiatic coast, Cilicia, Lycia, maritime Africa to the pillars of Hercules and crossed to Spain. The Greek lands during this period were without a sign of the disease, and the Arabs were repeatedly repulsed from the Imperial Territory, especially on the sea. The Greek Fire kept them away. Constantinople represented the Byzantine Empire, and whenever it had fallen to hands other than the Emperor's, the empire had fallen. During this entire span of time how Constantinople and the rest of the Byzantine Empire escaped the contagion cannot be definitely explained. There is no information in the Byzantine medical literature, nor do the chroniclers who tell of very trivial happenings record it, nor the hagiographers, nor the miracle-working saints, nor any other writer of any type or nature mentions it.

A few remarks may be offered to ease the darkness a bit. The Byzantine frontiers were closely guarded by the special border guards, the Acritai, whose duty it was to see that no smuggling in either direction was taking place; and the enemy following the tactics of his race and the times did not attack, raid or invade suddenly. Persons sick with smallpox could not undertake such tasks. The foreign merchants coming to Constantinople were housed in the State Hostelries. If their goods were not sold the State took care of their disposal for the account of the importer, who after the limited period of staying in Constantinople had to leave. The vigilance

and the strict enforcement of the rules of the Eparch was another strong measure. The Arabians or any other army in war then and now has to be in peak condition and not sick with such disabling, defeating and agonizing suffering in order to succeed in its objective. The distance requiring more than the incubation period, in most cases, would bring to light the infected persons and make them unable to reach their destination. All these factors must be considered to explain the freedom of Constantinople and the entire Byzantine Empire from smallpox. I wonder if there was any sporadic case. Why then should it have escaped the notice of the all recording gossipy chronographers?

La Porte du Theil,[12] commenting on the letters of Theodore Prodromos published in the *Greek Patrologia* of Migne (1864), raises a strong, emphatic and clear voice demanding attention and protesting against the judgment of the editors of the letters of Theodore and the renderings of the titles of the translators: "The subject of these letters appears to me curious. Theodore talks of an extraordinary malady. Theodore himself is unable to define it. The physicians of Constantinople had never known such malady, not the species nor the genus. He names it '*loimoxis*.' Le P. Lazari in his notices brands it 'maladia de cui è travagliato di rabbiosa fame'; in the Latin title 'devorante eum canina fame . . . .' Allatius calls it 'canina fame.' It seems to me evident of being an inflammation, eruption, great number of violent pustules, a fetid odor, contagious, loss of hair. From parallel symptoms, it is perhaps necessary to believe, I myself believe it, that this malady was precisely la petite vérole." This well thought out and correct observation and sound reasoning was not heeded. The letters with the misguiding titles, as given above, never excited curiosity nor attracted the attention of medical historians. Theodore tells of his affliction in letters as personal news to friends. Our author Theodore Prodromos is the celebrated orator, poet, prolific writer of prose, poems, satires, epigrams, letters, epitymbia, epithalamia, panegyrics and other literary pieces of secular and ecclesiastical nature, the favourite of the Imperial Court of the House of Comneni. After the philological researches of several persons interested in Byzantine literature, almost all had no courage to pass decision on the identity of the author, a question raised long ago. G. N. Hatzidakis'[13] opinion now prevails, that there must have

[12] F. J. G. Porte du Theil, Operum Theodori Prodromi Recensio, *Patrologiae Graecae*, tomus 133, J. Migne ed. Paris 1864.

[13] G. N. Hatzidakis, *Medieval and Modern Greek* (*Masaionika kai Nea Ellenika*) vol. ii, pp. 361 seq. (in Greek). Athens 1905.

been more than one Prodromos, probably about seven. The begging letters that used to be attributed to Prodromos now must be awarded authorship to Ptochoprodromos in distinction to our author. The early editors made no separation of the writers; they both lived during the Comnenian Era and both were known to the Imperial family. The letters that contain the smallpox case are without doubt by the hand of the celebrated man of letters, orator and poet, above mentioned. Of his family and personal history we know next to nothing. There can only be gleaned fragmentary information from internal evidence in his works. He was from a prominent old Orthodox Byzantine family, well established and holding appointments of high church offices, especially of the Greek Orthodox in Russia, probably in Cherson. His education, as we gather from his letters to former fellow students, was the very best, and he was well grounded in the classics and philosophy. One of his teachers was John Italus, " Supreme Philosopher " (Hypatus), a personage of importance in Byzantine education and letters.

The letters of Theodoros Prodromos that tell of his smallpox are three, one addressed to Orphanotrophos (a high imperial appointment similar to a great extent to Director General of Charities) and two to the Metropolitan of Trapezous. He begins to tell about the pestilence which afflicted him. He gives it no name but calls it by a generic term, pestilence, by which the medical men and the people understand its clinical and dangerous nature (loimoxis). He remarks and presents a wordplay upon euphemistic popular appellations of the terms or treatment. From this it is apparent that the medical profession had no special identifying name nor the distemper could had been known by a qualifying adjective. The eruption is a " *sore*," a general name common to a host of contagious diseases, without any further characteristic for differentiation. Even this particular sore is not described in detail, but in subjective platitudes. He is not a medical man. And profession did not know the disease. Now he begins to narrate of the pestilential affliction: " God smote me like the Ausites (Job) with a painful sore throughout the whole body, I say this for I have now been thrown into the most disgraceful condition to look at, and worst to suffer pestilence. For three days perfect monstrous flames and all the burning thunderbolts got hold of me and burned me to ashes; in addition to these, very much vomiting of bile and so immeasurable, that I was possessed by a fear, that I will be left hereafter without bile like the elks, after I had perhaps thrown up even the elemental bile also." Now he gives us a bit of information about the state of medical practice and science expressing his

own opinion. Theodore remarks of his consultant physician about his age, being very, very young and ignorant. The doctor, like all his Byzantine colleagues and the texts of the epoch, was unfamiliar with the type and nature of the affection, as it did not fit with the picture of the complaints known and treated then. " But on indefinite and unfounded basis muddling at so far-fetched a diagnosis of the condition, he called the pestilence Double Tertian Fever. . . . The fourth day's Sun arose upon these happenings, and at the same time small reddish raisings (papules) appeared on me throughout the whole surface of the flesh." Beginning the fourth letter addressed to Orphanotrophos, he tries to insert a quotation from the Bible applying to the sixth day, on which the letter is written, as a day of some miraculous and noteworthy event in ecclesiastical history. He adds that the duration of the disease is unknown. Referring to his pharynx and larynx, where the affection has extended, he describes his voice as coming in syllables from low down deep, of thin quality, and weak in strength. Then he talks about the pestilence which he was afflicted with: " By these letters we make known to you as much as the pestilence bestowed upon us, not by good luck. People have the custom to call this accursed pestilence with a name of veneration, in order that it may be more bearable to the sick on account of the name of blessedness." He refers to the medical vocabulary of euphemisms: " It is like the euphemistic names the sons of doctors give, *Hiero*-(s) nymics for the most poisonous of the drugs, and *Cryo*-(s) nymics for the sparking iron, and the bone at the seat they call *Sacrum*, but I call it the Seventh Plague, added to the others brought by Moses upon Egypt, fire and hail at the same time. First my own body is showered with hailstones from the top of the head to the nails of the toes, which are unblessed. Yes, I do justly call them hail on account of their color being white and of the shape being spherical. The body is heated violently through and through with extraordinary torches from the fever. . . . We have been in such acme of the affection, and the greater part of it we do not know the future." He proceeds and describes his condition in general and the further evolution of the reddish raisings: " little by little gradually on the seventh day became murderous pustules. Have you ever seen a violent shower of rain coming down on a lake, how the entire surface of the lake swells up on account of the closely packed bubbles? Such at this time think of my wretched flesh to have become. In addition of course, starvation and sleeplessness; and furthermore, here right here, the unchangeableness, and the arrows of the pains, and the peak of grief, and the sight to be thought ill-omened even by the kith and kin, intelli-

gence permits you to have in mind at the same time. Let it be so. These have happened and passed away." In the fifth letter we have a rather detailed portraiture of the after effects of the disease with the characteristic impressions and inner feelings of patients telling their woes to a friend or sympathetic soul: "When shall I come and shall I myself be seen before you? Then, in truth, I have been seen with the brandmarked and entirely variegated face, just like the hand-craftsmen and metal workers we see with their faces marked by the soot, or if you wish, and like the snakes with slough and horny scales, or like the flock of Jacob spotted and ash-coloured, with the head which has become bald and without hair; A sickly pate above the neck, to be precise. When shall I reveal to you with these lips the unjustice of the disease? I almost had my soul spitted out on account of this pestilence. Upon one thing only I was secretly comforting myself, that this dreadfulness might handle favourably for me the huge double-peaked beard. And surely to the disease and to myself I was saying a great deal." A detailed description is given of the process and condition of the face that preceded the actual falling of the beard, tinged with the subjective touch. "The malady in truth got hold of the bloody-guilty beard also. There I was talking and at the same time I was surveying the beard with my fingers. Then as it was entirely swollen and had been thoroughly inflamed, there nothing else happens, but I am filled with delight and I was calling the malady Saviour again and again, and especially because some Syrian (Arabian) old woman, navel-cutter (midwife) and barley diviner affirmed her statement solemnly declaring upon oath on the very Moon: 'not one hair of the beard will be left, absolutely.' I was mistaken of course. The hairs to my own sorrow flowed down to the ground, and as in the end of autumn, the head packed up and carried its own decoration. I say this, there is not one baldheaded man, that has seen me and has not immediately become dizzy, there is none furthermore with a thick beard that has met me and did not pray for me, right there in that spot, the earth to gape and swallow me. Why upon this you broke out a loud laughter?" The following part of the sixth letter to the Metropolitan of Trapezous gives a sort of final picture of the disease, that will be the permanent and lifelong record of the past: "Now of what sort and what do you think to be the remains and the results of the dye-dippings"? He compared his condition with the hand-dyed textiles, silk or cotton materials, commonly used at the time, a gruesome but perfectly true tableau. In this letter again he refers to the loss of hair before its time and how he looks and feels: "Not to relate in detail and disgrace the letter with shame of

narration, a strange monster, like those of Empedocles, I go around the city of Byzantium. But I entreat you, Golden Head, pray to the eponym of your Metropolis, the Golden Headed Mother of the God, to have my head gilted again with hairs."

COMMENT. Theodore Prodromos in his letters to friends gives salient points of the loimoxis that attacked him without prodromata nor a period of feeling below the usual condition, but *suddenly*, as any acute infectious disease, or fever. High *pyrexia for three days* with excessive vomiting. A doctor was consulted but could not offer relief nor cure nor information about the disease, but only called it Double Tertian Fever. On the *fourth day* papules were raised all over the skin. On the *seventh day* the papules became pustules, closely packed throughout the entire body. Pains, sleeplessness, grief, anorexia and the ensuing starvation. There were abominable, especially facial changes from the pustules. On the *sixth day pharyngeal* and *laryngeal changes* take place. It seems on this date and the seventh, although it is not definitely stated, not being a clinical record, that the eruption appeared. The sixth and seventh day events are not separated. Without the number of days of sickness he gives the *after results*. Thus we lack the duration. He emphasizes the facial changes; he may be giving the true and atrocious outcome of the disease or he may be too sensitive. Whatever he was endowed with, it was not pleasant to look at. The picture fits excellently the Unblessed Pestilence, or in Byzantine and Modern *Greek Evlogia*, known to us as *Variola* or *Small Pox*.

SUMMARY. Theodoros Prodromos was afflicted by the disease himself, survived and described the disease stage by stage to the very end with the after results in his correspondence to his friends.

This case is probably, at least at present, the earliest case of smallpox described in detail with masterful strokes by a European in a European language. Further research may prove it to be the first case with certainty. Till then the honours are saved for Theodoros Prodromos, if it will be so.

GILES HEALE, THE MAYFLOWER SURGEON

M. PIERCE RUCKER

Giles Heale, Barber Surgeon, who came over on the *ship's* memorable voyage that ended at Plymouth, December 10, (20 or 21) 1620, remained through the terrible winter of 1620–21, and returned to England with the Mayflower the following spring, was so completely ignored by the " First Comers " that he has remained entirely unknown until comparatively recent times. His resurrection from complete oblivion was brought about in a curious, round-about manner. In the last quarter of the 19th century, Henry F. Waters, A. M., found in the London Probate Records a registered copy of the nuncupative will of William Mullins. The will was dated April 2 (12) 1621 which was forty days after Mr. Mullins' death, as given by Prince, and three days before the *Mayflower* started on her return voyage. Now William Mullins, besides being a well-to-do and important member of the company, was the father of Priscilla who spurned Miles Standish to marry John Alden, and who was immortalized by Longfellow. His will was an important historical document. The will bore three signatures, John Carver, Giles Heale and Christopher Joanes, and named Mr. John Carver and Mr. Williamson overseers. Everyone, of course, knew that John Carver was governor of the colony at that time, but no one knew who Mr. Williamson and the other two witnesses were.

Henry Martyn Dexter, a well known divine and an authority on the history of Congregationalism, had in his possession a copy of Henry Ainsworth's *Psalms in Metre,* 1618, which had been " used in their service of song in the House of the Lord by the Church in Salem for forty years, and by the Church in Plymouth for seventy." The association interest of the book is further heightened by the fact that Henry Ainsworth was the scholar of the Separatists and a contemporary of the Mayflower Pilgrims. The book is now in the Henry Martyn Dexter Collection of the Yale University Library. On the recto of the fly-leaf at the end is still pasted a clipping from a bookseller's catalogue offering for £2, 12s. 6d. a copy of the same volume. The bookseller adds, " This is an interesting volume to the American collector for its first fly-leaf has the following inscription: " This booke was given unto Mr. Giles Heale, Chirurgeon, by Marke Allerton, Tailor in Virginia, the X of February in the year of our Lord 1620: Da Williams." Dr. Dexter infers from the inscription

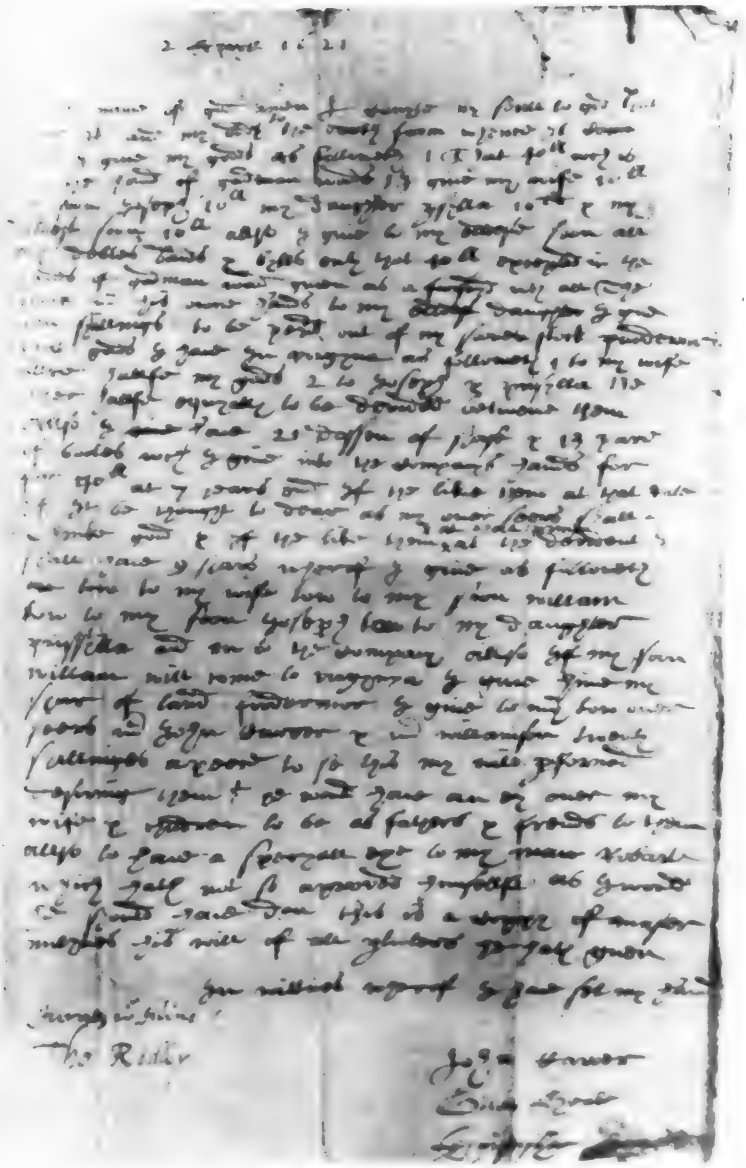
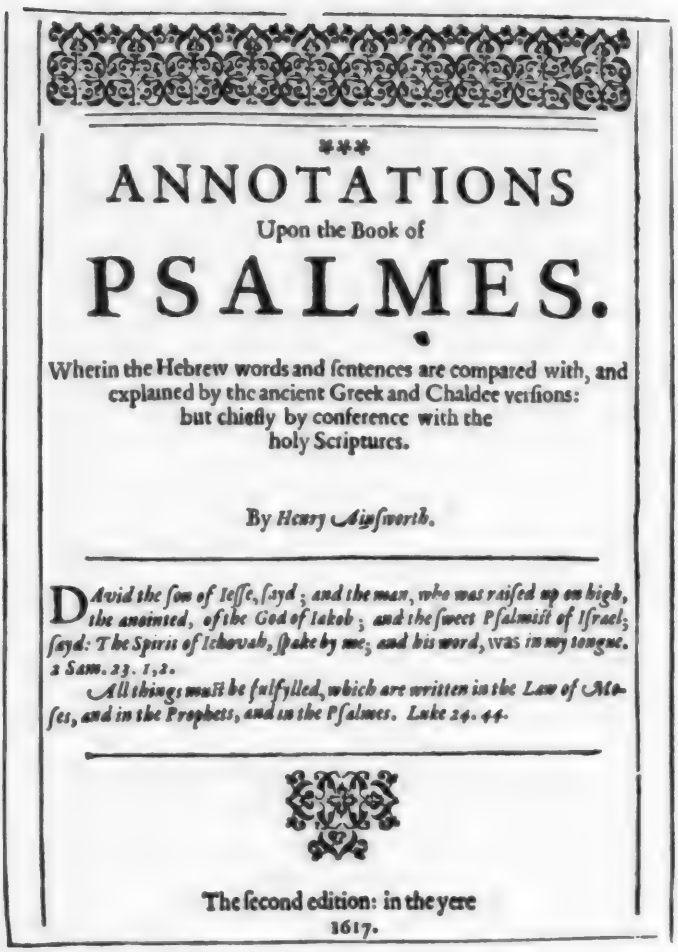


FIG. 1.

William Mullins' Will. Copied from Colonel Banks' article W. Mullins and G. He... *Proc. Mass. Historical Soc.* 60: 143, 1926-27.



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ANNOTATIONS

Upon the Book of

PSALMES.

Wherin the Hebrew words and ſentences are compared with, and explained by the ancient Greek and Chaldee verſions: but chiefly by conference with the holy Scriptures.

By *Henry Ainſworth.*

DAvid the ſon of Ieſſe, ſayd; and the man, who was raiſed up on high, the anointed, of the God of Iakob; and the ſweet Pſalmiſt of Iſrael; ſayd: The Spirit of Iehovah, ſpake by me; and his word, was in my tongue. 2 Sam. 23. 1, 2.

All things muſt be fulfylled, which are written in the Law of Moſes, and in the Prophets, and in the Pſalmes. Luke 24. 44.

The ſecond edition: in the yere 1617.

FIG. 2.

Dr. Dexter's copy of the "Psalms in Metre."

Courtesy of the Yale University Library.

that Giles Heale was the ship's surgeon and that Da. Williams was meant for David Williamson who was named in the will as overseer. In the second conjecture he was wrong as we shall see later.

18 **AMERICANA.**—Ainsworth (H.) Annotations upon the BOOK of PSALMES IN THE YERE 1617. THE PSALMES IN METRE, *with Psalme Tunes, Imprinted in the yere* 1618. Fine Copies, in the original old stamped binding, calen boards, £2 12s 6d

(*Printed abroad*) 1617—18

An interesting volume to the American collector. The first fly-leaf has the following inscription:—"This booke was given unto mt. Giles Heale, Chirurgion, by Marke Allerton, Tailor in Virginia, the X. of February, in the yeare of our Lord 1620. Da: Williams:" and on the last fly-leaf the autograph of "Mary Hele, her Booke," followed by an anagram. ⁂ A CURIOUS RELIC OF SOME OF THE EARLIEST ENGLISH SETTLERS IN AMERICA.

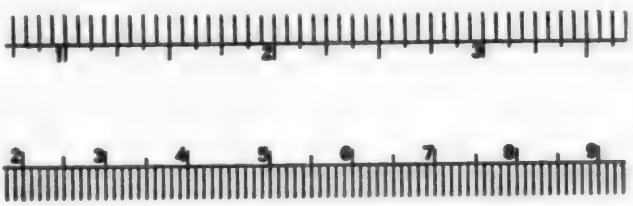

FIG. 3.

Clipping from E. Parsons & Sons catalogue in Dr. Dexter's copy of the "Psalms in Metre."

Courtesy of the Yale University Library.

The book described by the clipping is in the Virginia State Library. How it got there is not certainly known as no record was kept of purchases by the Library in the eighteen-seventies and eighties. The fact that it had belonged to "Allerton in Virginia" may have influenced the purchase, for the Allertons in Virginia is an important family with wide connections. It is interesting that the early Pilgrims persisted in claiming to be Virginians. When Mr. Robinson and his Church began to think of removing to America, the Dutch would have them go under them and made them large offers, but they determined to go under the English government. They at length decided on Virginia, so as to settle in a distinct body

but under the general government of Virginia. Accordingly, they obtained a patent from the Virginia Company. In the famous Mayflower Compact which the "First Comers" drew up and signed before they put foot on land, they describe themselves as being engaged in planting the first colony in "ye Northerne parts of Virginia." In William Mullins' will there is provision that his son William, Jr., is to receive his share of land if he will come to Virginia and also "of the goods which he has in Virginia" he gives to Alice one-half and to son Joseph and daughter Priscilla one-quarter each.

The date February X, 1620, is confusing, as it looks as though Allerton were in Virginia some seven months before the Mayflower sailed from England. It should be recalled, however, that the Gregorian calendar was not adopted in England until 1752. Before that time the English legal and ecclesiastical year began on March 25th. After 1582 when Pope Gregory corrected the Julian calendar, there was great confusion in dates. Most catholic countries adopted the new calendar at once. Germany and Sweden adopted it about 1700. By an act of Parliament the English year 1752 began on January first as has each succeeding year. The same act provided that in the year 1752 the days September 3-13 inclusive be omitted from the calendar in order to bring the calendar year into conformity with the solar year. That the Pilgrims followed the English calendar as it existed in 1620-21 is shown by William Mullins' will. William Mullins died February 21, 1620. A few weeks later Governor John Carver put the nuncupative will in writing and dated it "2 Apryll 1621."

But I digress. The little book in the Virginia State Library is really two books bound together. The first is the second edition of Henry Ainsworth's *Annotation upon the Book of Psalms*. 1617, and the second is his *The Psalms in Metre*, 1618. It bears several interesting inscriptions. On the first fly-leaf there is a manuscript note as follows:

> The Booke Was given unto
> me Giles Heale Chirurgion
> by Isacke Allerton Tailor
> in Verginia the X of
> February in the Yeare of Our Lord
> 1620

On the back fly-leaf is written in a similar hand:

> Mary Hele
> her Booke

Exe G H M Testes
February the xiiii in the Year of Our Lord
1621

In several places in the book is written "Da: Williams" in an entirely different hand and once there is the date March 26, 1701, apparently written by said Williams. This confutes Dr. Dexter's supposition that Da: Williams was meant for David Williamson, the factor on the Mayflower.

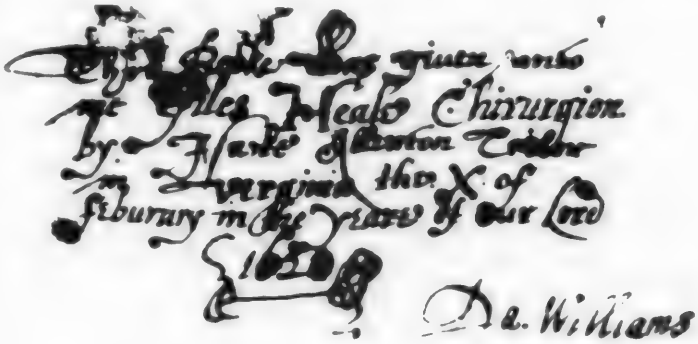

Fig. 4.

Giles Heale's autograph in the book in the Virginia State Library.

Courtesy of the Virginia State Library.

The late George Ernest Bowman, Editor of the *Mayflower Descendant*, has described this book and its inscriptions. He considered it to be one of the few genuine Mayflower relics. In his search for all possible information about the book, he lifted the bookseller's notice that is in the Yale copy and discovered that the clipping was from the catalogue of E. Parsons & Sons, 45 Brompton Road, London, England, of a date some time before 1888.

The inscriptions in the book correspond with known facts of the "Plimoth Plantation." Isaac Allerton, donor of the book, was the fifth signer of the Mayflower Compact. In the Netherlands he was known as a tailor; in New England he became the first New England merchant. At first he was highly thought of in the Old Colony, acting as governor when Bradford was sick. He paid several visits to London on business for the Colony. Characteristically, these did not turn out well, and characteristically, the Pilgrims accused him of lining his own pockets. When they

Fig. 5.

Mary Hele's and Da Williams' inscriptions in the book in the Virginia State Library.

Courtesy of the Virginia State Library

dealt with the Indians, the Pilgrims were successful traders, but when they dealt with the old country they were always worsted and they always set up a howl. The result was that Allerton was practically excommunicated. Point Allerton, at the entrance of Boston Harbor, was named for him, but that was when he was in good standing. He established trading posts in Maine and later formed a partnership with Govert Loockerman in New Amsterdam. His ships were engaged in trade with Virginia and the West Indies.

Allerton married three times. His first wife was Mary Norris of Newbury, England, whom he married at Leyden on November 4, 1611. She bore him three daughters. One of these, Mary, was the last surviving Mayflower passenger. His second wife, Fear Brewster, bore him one son, Isaac. Isaac, Junior, took up his residence in Northumberland County, Virginia. A daughter of Isaac, Junior, became the second wife of Hancock Lee of " Ditchley." Isaac, the emigrant, married his third wife at the age of sixty and with her he settled in New Haven where he finished out his life in peace and contentment.

The next owner of the book is scarcely known in American medical history although he was the first licensed practitioner in New England. For some reason he is not mentioned by Bradford. Dr. Samuel Fuller is spoken of as the only medical man who came over with the settlers at Plymouth. He held the office of deacon in the Reverend Mr. Robinson's church. He was a religious man and very useful as a physician and surgeon, although it does not appear that he had any formal training in medicine. The only printed reference to Giles Heale in medical literature is in *A Brief History of Medicine in Massachusetts* by Henry R. Viets, Boston, 1930. He is mentioned also in the unpublished Fitzpatrick Lectures, " Medical Interchange Between the British Isles and America before 1801." World War II prevented Dr. Malloch from presenting this lecture. I understand from Dr. Malloch that these lectures are now being printed.

Professor Miles H. Phillips has gotten for me the following information from the Librarian of the Royal College of Surgeons of England. " The College records go back only to 1745 when the surgeons separated from the barbers, but the College has a transcript of the earlier records of the Joint Company. The Barber's Hall was destroyed in the great fire raid of December 1940. The records, however, are safe but not available at present."

The transcript of the record of the Barber Surgeons Company, made

by R. R. James, F. R. C. S., and deposited by direction of the Barber's Company at the Royal College of Surgeons of England, shows the entries concerning Giles Heale.

> Giles Heale, Surgeon
> apprenticed to Edward Blaney 1611/12
> Freeman 1618/19 as Hele
> of Drury Lane in 1641

Mr. James has added the note: "Probably the Giles Heale, Barber-Surgeon, who sailed in the Mayflower to New England. He returned to England in 1621." Mr. James also records the following will, possibly the man in question: "Probate Court of Canterbury, Brent 320: 4 April 1653, proved 26 April by Mary, relick, Will of Giles Heald, Chirurgeon of St. Giles in the Fields."

The Annals of the Barber Surgeons of London, compiled by Sidney Young, London 1890, shows that Edward Blaney, Beadle, was dismissed July 21, 1608, for behaving himself "very dishonestly." The same work has a list of the duties of the beadle. As it is just a single sentence and as it throws so much light on the practice of the times, I quote it in full.

> Among the duties of the beadle may be enumerated, sweeping the garden, collecting quarterage, cleaning the Hall, whipping naughty apprentices, summoning freemen, etc. bringing home dead bodies from Tyburn, keeping lists of journeymen, pressing Surgeons and Barbers for sea service, assisting the masters on search days, hunting up and laying information against non-freemen practicing Barbery and Surgery, marshalling and leading processions, both at the Hall and in the City pageants, guarding the Parlour door, and other offices too numerous to particularise, though there were few of them which did not yield a fee, and indeed our Beadle could hardly have lived without fees, for his official salary in Edward VI's time was but £4 per annum, which notwithstanding the greater value of money then, could scarcely be considered a fat living.

A requirement of the Barber Surgeons was that vessels carrying passengers overseas must have a ship's surgeon. The Mayflower sailed the year after Heale had completed his apprenticeship. He was therefore eligible for the position. Whether he were seeking adventure, new fields to practice, or merely needed a job, we have no means of knowing. Nor do we know just what he did on the trip. It is fair to assume that he had his hands full when the crew began to have the "general sickness." It was plainly his duty to look after the health of the crew and the passengers while they were on board the ship. Whether he helped out on shore or not is uncertain. There was certainly the need, for at one time

there were only six or seven sound persons to help with the sick. This was beyond his duty, but frontier conditions wiped away legal barriers in the practice of medicine. In the New World there were no distinctions between physician, barber-surgeon and apothecary. The physician practiced surgery and the surgeon practiced medicine and the preacher, especially in New England, practiced both. Of course, he may have been sick. The record is silent on this point. But if he were not sick he most certainly must have helped with the sick on shore. Most likely he attended William Mullins for he witnessed his will and he probably also attended Mary Allerton in her last illness, as is evidenced by the gift of the book of Psalms.

The Mayflower's voyage lasted nine weeks, and the little vessel was overcrowded. Nevertheless, the settlers were slow in making up their minds where to locate. It was more than six weeks after they had touched land before they decided to " plant " at Plymouth. On December 23rd the men were away attending to the settlement when a sudden storm broke. At the height of the storm, with the Mayflower dragging at anchor and leaping about like a wild thing, Mary Allerton, the tailor's wife, was brought to bed and delivered a stillborn son. This was the third birth on the Mayflower. Mary's health failed rapidly after her confinement and two months later, (February 25th) she was dead.

It is unlikely that either Giles Heale, the Mayflower's surgeon, or Dr. Samuel Fuller, " the Mayflower's physician," attended her. The record says that the men were away attending to the settlement. In any event an uncomplicated delivery in 1620 was strictly a woman's affair. Only in extraordinary circumstances were male practitioners called in. For this reason they were often termed extra-ordinary men-midwives. The record does not say much about the confinement or the cause of death. Cornwall in his " Notes on the Medical History of the Pilgrim Fathers " has this to say about the sickness that was so fatal in that first winter: " Dr. Fuller left no reports and Bradford and Winslow were incapable of reporting on medical matters with precision." There were 102 passengers. Of these 61 were adults, 31 were children and 10 were servants. Seventy-four were male and 28, female. They were about five months on board ship in close quarters and had unsatisfactory food. One hundred were sick at one time or another, and 50 died. The first sickness occurred after the voyage had been completed and was caused by eating mussels. This was just an interesting incident, but with wading ashore in the stormy weather, coughs and colds became well nigh universal. At one time there

were only six or seven sound persons to look after the sick. Cornwall thinks the " general sickness " was acute tuberculosis. The duration of the illness was about two months which is too long for small pox, typhus fever and other plagues. Then, too, the members of the ship's crew who remained well until they moved into the quarters vacated by the Pilgrims, were similarly affected. The mortality with the crew was also about fifty percent, and the sickness was so general that the return voyage could not be undertaken until spring.

If the " general sickness " were indeed tuberculosis, Mistress Allerton's illness fits into the picture. It is well known that the consumptives stand pregnancy well especially after the stage of " morning sickness " is past, but they go to pieces rapidly in the puerperium. The strain of delivery and the loss of blood start them on the downward path to a rapid dissollution. The storm may have precipitated Mary Allerton's delivery and the labor caused her failing health. It is at this time that Giles Heale attended her, for the duties of the ship's surgeon were to " attend the sick and cure the wounded." On February 10th, just fifteen days before Mary's death, Isaac Allerton gave him the book of Psalms as evidence of his affection. Thus the book establishes another first, the first G. P. (grateful patient) in New England and probably the first in America.

February 21st was a busy day for the grim reaper for on that day " die Mr. William White, Mr. Mullins with two more; and the 25th dies Mary, the wife of Mr. Isaac Allerton." Before William Mullins died he dictated his will to John Carver. It was this will that Giles Heale signed at Plymouth three days before the Mayflower started on her return voyage. The will was recorded in the Probate records of the Archbishop of Surrey. It was the first will ever made in New England and it proves unquestionably the presence of the " first licenced practitioner definitely to serve in Massachusetts Bay." Charles Edward Banks succeeded in locating the original will and published a photograph of it in the Proceedings of the Massachusetts Historical Society. It shows Governor Carver's bad spelling, notably " virgyna," " allce " (for Alice) and " prisylla," and bears the only known signature of John Carver. Colonel Barnes compared the signature of Giles Heale on the will with that on a petition dated 1651 of Freemen of the Guild Companies of London, and that on the will dated April 4, 1652, (P. C. C. 320 Brent) and found the three the same when due allowance is made for the " usual change in writing matured by age." The writing on the fly-leaf of the book in the Virginia State Library is apparently the same.

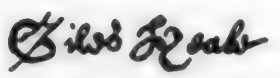

FIG. 6.

Giles Heale's signature to a petition of Freemen of the Guild Companies of London from Colonel Bank's article.

Courtesy of the Massachusetts Historical Society.

FIG. 7.

Giles Heale's signature on his will, from Colonel Banks' article.

Courtesy of the Massachusetts Historical Society.

When the Mayflower returned to England in 1621, Giles Heale was on board. Whether he had any intentions of remaining with the Colony, as many ship's surgeons did in other colonies, we do not know. The outlook was none too bright and he lacked the religious ferver which alone could have made the dismal surroundings endurable. He gave his book to his wife. It was the only thing he could have brought her from New England at the time, and settled down to practice his profession in Drury Lane. Willison says that he was a successful practitioner. His name appears in a Subsidy Roll of 1641, taxed as Geiles Heale Surgian in Drury Lane. On April 4, 1652, he made his will which reads as follows:

In the Name of God, Amen:

I Giles Heale of the parish of St. Giles-in-the-Fields in the Countie of Midd(lesex) Chirurgeon beinge infrime and weake of Bodie but of Sound and perfect memorye praysed be God doe make and ordaine this my last will and Testament in manner and fome following:

First I bequeathe my Soul into the hands of Almighty God my Creator and my Body I comit to the Earth to be decently interred at the discretion of my deare and loving wife and Executrix hereafter named; And concerning my small portion of worldly goods I dispose thereof as followeth Vizt:

Imprimis I give unto my Brother Henry Heale my gray Cloth Cloke my best Hatt and a Satten Capp and one Holland shirt. The rest and residue of all and singular my goods and Chattles and Debts whatsoever and wheresoever I give and bequeath unto my beloved wife Mary Heale whom I make constitute and appoint full and sole Executrix of this my last will and Testament hereby revoking all former Wills and Bequests. In witness whereof I have hereunto sett my hand and seale this fourth day of April one thousand six hundred fifty and two.

GILES HEALE

He was buried February 3, 1652/53, as shown by an entry in the parish register of St. Giles in the Fields.

The question naturally arises, why did the Pilgrims ignore the ship's surgeon so completely. Williams writing in 1850 "A Brief Historical

Notice of Medical Science in Massachusetts from the Landing of the Pilgrims at Plymouth to the Present Time" speaks of Fuller as the only medical man who came over with our ancestors at the time of the settlement of Plymouth. He came over with the first ship. "He was a religious man and very useful as a physician and surgeon." It was not until 1930 that Heale's name appears in medical history. Viets considers him to be the first licensed practitioner to serve in Massachusetts Bay.

Unquestionably the Pilgrims were long suffering, determined and filled with "answerable" courage. They lacked many of the lesser virtues that make a people lovable. Among these was tolerance. They either damned, jailed, banished, or ignored those who did not embrace the Holy Discipline. According to Willison whose recent book *Saints and Strangers* makes such interesting reading, they did not go so far as the Puritans who sometimes hung "Notoriouse heretiques".

Since the Mayflower was a passenger ship making passage "beyond seas" she was required to carry a barber-surgeon. Captain John Smith writing in 1626 *(Accidence for Young Seaman)* described his duties as follows: "The Chirurgeon is exempted from all duty but to attend the sicke and cure the wounded: and good care would be had that he have a Certificate from the *Barber-Surgeons* Hall for his sufficiency, and also that his Chest bee furnished both for Physicke and Chirurgery, and so neare as may be proper for the clime you goe for, which neglect hath beene a losse of many a man's life." It appears from the records of the Barber-Surgeons Company that Giles Heale finished a seven year apprenticeship a year before the Mayflower sailed. No doubt he had a certificate from the Barber-Surgeons Hall for his sufficiency. He was, therefore, not only qualified for the position, but was certified to that effect. On the other hand, Samuel Fuller, who has come down through the years as the Mayflower's physician, had no medical training as far as it is known. His library consisted of thirty books, two of which were dictionaries. There were no medical items among them. He was a deacon in Mr. Robinson's church in Leyden and was related by blood or marriage to most of the Pilgrims. Harrington says that Samuel Fuller's father, Robert, was a butcher, so Morton was probably correct when he said that Samuel was bred a butcher, "and was always ready to practice his trade upon the unsuspecting. Nor was any good." Morton's description of the doctor has value in being a contemporaneous account, but it should be remembered that Morton had no great love for the Pilgrims. I quote from his "New English Canaan" as reprinted in Force's *Historical Tracts* (Vol. 2, p. 101):

[The] Counsell of the whole Synagoge chose for their doctor one that had speciall gifts: Hee could wright and reade, nay more: hee had tane the oath of abjuration, which is a speciall stepp, yea and a maine degree unto perferment * * * * Hee weares a longe beard, and a Garment like a Greeke that begged in Pauls Church. This new made Doctor comes to Salem to congratulate: * * * * How hee went to worke with his gifts is a question yet hee did a great cure for Captaine Littleworth, hee cured him of a disease called a wife, and yet I hope this man may be forgiven if shee were made a fitting plant for heaven.

By this meanes hee was allowed 4. p. a moneth, and the chirgeons chest, and made Phisition generall of Salem: where hee exercised his gifts as well, that of full 42. that there hee tooke to cure, there is not one has cause to complaine, or can say black's his eie. This saved Captaine Littleworths credit that had trick'd away the vittels: though it brought forth a scandall on the Country by it, and then I hope this man may be forgiven, if they were all made fitting plants for heaven.

With such criticism circulating outside the Pilgrim's circle, Dr. Fuller was probably a little sensitive. His lack of formal training made matters worse. He disliked competition with one who had the training he lacked and had no intercourse with him, if it were possible to avoid it. When he could not avoid it, he said nothing about it and his friends and relatives supported him in this stand.

This is the first occasion I have had to study the Mayflower literature. It has characteristics all its own. The writers are none too careful about their references. The contemporary writers, Bradford, Winslow, and Morton, were quite careless when it came to names. The *ship's* name for instance does not appear until 1623. One unearths a date or a name and then makes a guess which gives his successor something to write about. A subsequent writer corrects this error and in turn makes a wild statement such as " being descended from John Carver " who is said by others to have had no children. In this way a mass of interesting " Literature " has been built up. The identity and fortunes of the ship's captain is a case in point. Bradford simply calls him Mr. Jones. When Waters discovered the Mullins will he argued that the signer, Christopher Joanes, was the Mayflower's captain since no Christopher Jones was among the passengers. Colonel Banks says that this is unlikely as the ship's captain would sign before and not after the ship's surgeon. Azel Ames who reconstructed the Mayflower's Log in 1901 gives the captain's name as Thomas Jones. He further states that said Jones was under arrest under charge of piracy. He was gotten out of jail by the Earl of Warwick, the friend of Sir Ferdinando Gorges, that he might take command of the " Falcon " when it took a load of cattle to Virginia. When he returned from Virginia, he was loaned to Sir Ferdinando for the express purpose of hi-jacking the colony.

Sir Ferdinando was having difficulty in getting settlers for his patented lands of the second Virginia Company, and this seemed the simplest way of accomplishing his purpose. It is quite evident that the Pilgrims did not go where they intended, and this explanation appears to be a plausible one. On the other hand, Marsden from an examination of the records of the High Court of Admiralty comes to the conclusion that Christopher Jones was captain and part owner of *the* Mayflower. He says that there were 40 or 50 Mayflowers in the beginning of the 17th century. The identity of a vessel is difficult for the records give various tonnages for vessels that are known to be the same ship. Furthermore, the registry varies. Christopher Jones was known to have commanded a Mayflower of 140 tons, but there is no record of Christopher Jones' Mayflower from 1616 to 1624. His most upsetting finding for the adherents of the Thomas Jones theory is the record that a Thomas Jones was in Virginia in command of the Falcon in September, 1620. This date must be incorrect for the first mate on the "Falcon" on its cattle-carrying expedition was John Clarke, and John Clarke was the first of the Mayflowers' crew to be signed up. Cashman in a letter of June 11/21, 1620, says of Clarke that he "went last year to Virginia with a ship of Kine." Willison supports the Christopher Jones idea on the basis of Marsden's findings, but in either case the Pilgrims were the victim of the first big scale hi-jacking in the history of this country.

Summary

Evidence is adduced to show that Giles Heale was the surgeon on the Mayflower, that he practiced at Plymouth the winter of 1620-21 and that he returned to London in the spring of 1621. He was connected with so many "firsts" in the history of New England that it is surprising that he has been so neglected by historians. He witnessed the first big scale hi-jacking in the history of the country. He attended the first maternal death in New England. The patient's husband was the first New England merchant. The patient was the first G. P. in the English colonies. He, himself, was the first licensed practitioner of medicine in the Massachusetts Bay, and his presence at Plymouth is proved by the first will made in New England. That such a man should be so completely ignored is unbelievable. A plausible explanation for this is advanced.

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NATHAN P. RICE, M. D. AND HIS *TRIALS OF A PUBLIC BENEFACTOR*, NEW YORK, 1859

HENRY R. VIETS

In 1856, ten years after the public demonstration of the value of ether anesthesia in surgery at the Massachusetts General Hospital, Dr. William T. G. Morton found himself beset with legal and pecuniary difficulties, being besieged on all sides by duns, writs and constables. Indeed the man whose " eager brain " had decreed the death of pain, had ruined his health, his occupation and his fortune in his attempt to justify his position as the major claimant in what had become the " ether controversy." Gone was his farm and those prize milch cows and Jersey stock, the " glorious Suffolk pigs " that formerly won premiums for him at the fair of the agricultural society of Norfolk County, near the site of his country home, Etherton Cottage, in West Needham, Massachusetts. His last trip to Washington, in the forlorn hope of convincing the government that restoration should be made to him for infringements on his patent, had only been made possible by the pledge of his dental instruments and library, and the gold medal from the French Academy. Now home again, a broken man, good neighbors among his Boston friends, soon fully supported by the medical profession in New York and Philadelphia, began a plan for a " National testimonial." The petition to Congress of former years was gotten out, meetings were held at various points and new appeals to the public were issued.

One of the most active groups was in New York, headed by Valentine Mott, Willard Parker, Marion Sims and others. Meeting at Parker's home, it was soon seen that a comprehensive account of the circumstances connected with and growing out of the demonstration of 1846 was badly needed. The author was chosen by Morton in June, 1858 and the committee of physicians, in July, pronounced him " a gentleman who is fully competent to the task." The gentleman, so completely endorsed by John Watson, Willard Parker and other members of the executive committee of the Physicians and Surgeons of New York, was Nathan Payson Rice, M. D., a New York practitioner of 29 years of age, who had established himself in the city a few years before and who had written medical articles for books and magazines to help out his scant resources from surgery and general practice. An account by Rice of his adventures in writing the

Trials of a Public Benefactor for Dr. Morton, has recently come to light.[1] From it we learn that Rice too had his "trials," for he was dealing with a highly explosive man, given to rapid and frequent upsetting decisions, bedevilled by creditors and impatient with his friends.

Rice states that, on June 6, 1858, just at the height of the fund-raising campaign and indeed a part of it, "Dr. Morton, a stranger to me, made the proposal to write for him a sketch of his life and history of the discovery of etherization, he to furnish all the materials and be responsible for all the statements, personal and otherwise." An agreement was drawn up two days later and Rice, finding the material too great to bring to New York, did the work in Morton's house, probably Etherton Cottage in West Needham. In two months, from June 8th to August 5th, the first portion of the book was put into Morton's hands and by September 1st it was ready for Morton's final approval. Rice must have worked like a slave those three summer months at Etherton Cottage, to turn out a manuscript that ultimately became a book of 460 pages. Presumably he had a great mass of material, previously partly digested by Benjamin Perley Poore, whose *Historical Materials for a Biography of W. T. G. Morton, M. D.* had already been printed in a preliminary form in 1856, a work of 114 pages, issued in interleaved copies "for such revisions, additions or alterations as Dr. Morton's friends may seem (*sic*) fit." Poore had warned that the "re-publication of any portion or of all of it, should a copy find its way into public hands (which is not intended), is positively forbidden." Apparently the few copies of Poore's work were in Morton's hands, but not in "public hands," so no restrictions were placed on Rice in using parts of Poore's writing.[2] So rapidly did Rice work that the printer of the *Trials*

[1] The handwritten notes by Rice (Appendix 1) occur in a copy of the *Trials*, presented by him to the Harvard Club of New York City, and withdrawn from the Club Library in 1923. They cover three and a half pages of the back of the front cover and fly leaves. A few typographical corrections are found throughout the text, presumably by Rice. The book is now in the Boston Medical Library.

[2] *Historical materials for the Biography of W. T. G. Morton, M.D., Discoverer of Etherization, with an Account of Anaesthesia, Compiled by Benjamin Perley Poore. Entered according to Act of Congress, in the year 1856, In the Clerk's office of the District Court for the District of Columbia. A few copies of this compilation have been published, for such revisions, additions or alterations as Dr. Morton's friends may seem fit. The re-publication of any portion or of all of it, should a copy find its way into public hands, (which is not intended) is positively forbidden.* Washington: G. S. Gideon, Printer. 1856. pp. 114. Interleaved. Yellow paper cover, with title page on front cover.

Copies: Mass. General Hospital (Treadwell Library); McGill University (Osler Library); Boston Medical Library (lacking last two pages); *etc.*

Notes: There is a place for numbering the copies on the title-page, but numbers were not used in the copies seen. It was copyrighted in Washington in 1856, presumably by

actually had the advance proof-sheets bound and sent out as "press copy" for review some time before November 1, 1858. These advance copies lack the portrait of Morton, the quotations on the title-page, the copyright by Rice and the verses used as chapter headings.[3] Otherwise the book was virtually complete. Rice reports that on October 16, 500 copies were printed and 100 bound. The 100 were sent "to various papers, private individuals and over the country." Rice found, on October 18th, that Morton had put his name (Rice's) on the title-page, "which I had never intended," and portions were added for which he was not responsible. Morton also chose the title. Rice was annoyed, but Morton refused to yield until a new arrangement was made. Finally Rice was given the liberty to correct the manuscript as he saw fit. In the meantime, Morton was having difficulty in finding the money for publication and, after two months, Rice gave in, transferring his copyright and all interest in the book, on condition that the publishers assume the debt owed him by Morton for preparing the manuscript. The wrangling continued, a suit was instigated, but the book was published, in the same form as it was originally printed in the "press copy" and offered for sale at the book-stores on February 14, 1859, with that year on the title-page. How much Rice received for his arduous labors is not known, but he certainly came away from his unfortunate experiences with Morton an unhappy man. The same month of February he had printed in *The Knickerbocker, or New-York Monthly Magazine,*[4] an article giving Horace Wells of Hartford the major credit for introducing anesthesia, although Morton was unmistakably recognized as the first to give a public demonstration, thus expressing his evaluation of Morton, the man whose life and work he had so fully expounded in the *Trials of a Public Benefactor*. The incident for

Poore, but no individual is designated. This may have been done by Poore, Morton or the printer. Poore does not mention the compilation in his two volume autobiography, *Perley's Reminiscences of Sixty Years in the National Metropolis*, 1886, nor it is referred to in the *Dictionary of American Biography*.

Morton does not seem to have had complete control of this book by Poore, or possibly some other book then in preparation, for he stated, according to Rice, to his publishers, Pudney and Russell, on October 1, 1858, that "it was all important it [the *Trials*] should appear at once as an opposition book was daily expected."

[3] There is a "press copy" in the Boston Medical Library, dated 1858.

[4] Dr. N. P. Rice, "A Grain of Wheat from a Bushel of Chaff." *The Knickerbocker, or New-York Monthly Magazine*. Vol. 53, pp. 133-138. This must have been written during the height of the altercation between Rice and Morton over the publication of the *Trials*, probably when Rice gave up his copyright to the publisher in December, 1858. The article is restrained and shows no sign of animosity toward Morton on the part of Rice.

Rice was quickly closed and he went on to a different life, having met and lost confidence in Morton as a man as well as the chief figure in the " ether controversy."

Two unusual, but un-matched men had met and soon parted, not a surprising result when Rice's background is considered. It is difficult to conceive how they could have had much in common, for Rice came from the Brahmin stock and did not easily tolerate the shrewd and not infrequently doubtful dealings of Morton, the opportunist, with his unstable personality and scanty cultural attainments.

The Life of Nathan Payson Rice, M. D.

Dr. Rice was born in Boston, May 26, 1829, the son of Nathan and Elizabeth (Lincoln) Rice. The Lincoln family had long been settled in Hingham, Massachusetts. His father, a prominent Boston merchant to the firm of Rice and Thaxter, with an office on Long Wharf, included among his business interests the control and management of the Hingham " packets," carrying passengers by sea between Boston and Hingham. In some personal reminiscences,[5] written for his class at Harvard College, Rice describes himself as a boy of five,—" fat, red-cheeked, tow-headed and strongly addicted to fighting." He goes on to say, " I had more than an average number of narrow escapes being nearly killed several times and being dangerously wounded times without number." Apparently he was an active youngster and difficult to handle, for as a child he was moved from school to school. In his sixth year he was sent to the school in Boston kept by A. Bronson Alcott, the Transcendentalist. The school, radical in character, had just opened in the Masonic Temple on September 22, 1834 and young Rice must have been one of the earliest pupils. Alcott put " great emphasis upon moral education cultivated by a conversational method of question and answer through which he endeavored to elicit from children those rational ethical ideas which he believed innate in every one." [6] Rice, surprisingly, in this school so foreign to nature, became " somewhat of a prodigy," as can be seen by references to him in Alcott's account of his methods of teaching, *Conversations with Children on the*

[5] *Class Book of the class of 1849, Harvard College,* pp. 419-424. Harvard University Archives.

Rice notes that the writing of the autobiographical notes for the class book " is one of the old established customs of Harvard (which I for one will never transgress)." This record ends Dec. 28, 1850, when Rice was 21. Additional notes by Rice bring the record to May, 1889, p. 425.

[6] Amos Bronson Alcott. *Dict. of Amer. Biog.,* vol. 1, p. 139.

Gospels.[7] The " conversations " commenced in October 1835. Ten of the children, including Nathan, were under the age of seven. When Alcott asked the group of children if they understood the " conversations," Nathan, then only six, said, " I understand a good deal." The boy remained with the school for two years, but finally became " too much for the temper of Mr. Alcott " and Nathan was placed under a series of private tutors for the next few years.

In the meantime, when Rice was ten, his family moved to Cambridge. There he went to the public school but he says because of his pranks he became a nuisance and finally he was packed off to a private school in Waltham. From this school he ran away on more than one occasion and " became a perfect ruffian." Finally, he settled down and at the age of sixteen passed his examination for Harvard College.

Even there he was continually in conflict with the faculty. In the summer he was sent away for six months to be under a private instructor and he was apparently never fully adjusted to college life. He did, however, graduate in the class of 1849, although he left college before the end of his term.

In February, 1849, gold had already been found in California. Rice, with twenty other boys from college, left on a sailing vessel in February of that year. On the third day out, they encountered a gale off Cape Hatteras and it took forty-five days to get to Rio. There they remained for a month, patching up the boat and resumed their passage around the Cape. Rice recalls that on his twentieth birthday, May 26, 1849, they met another gale but finally reached San Francisco on September eighth, a voyage of one hundred and twenty days.[8]

In San Francisco, Rice became sick with dysentery and had to remain there three months. He did no hunting for gold but was busy trying to recover his health, as apparently he was severely ill. Instead of joining the gold rush, he decided on another sea trip and went to the Sandwich Islands where he spent three weeks. Then on a voyage taking ninety days, he finally got to Singapore where he remained a week and so on to Calcutta

[7] A. Bronson Alcott. *Conversations with Children on the Gospels*, 2 vols. Boston: James Munroe, 1836-7. The children sat in a half circle, with Alcott asking questions, the children raising their hands to answer and Elizabeth Peabody took the notes. The scene is pictured at the beginning of the book. The school fell into disrepute and closed in 1839. Alcott soon turned to his community venture, Fruitlands, which also ended in dismal failure, with its members on the brink of starvation, in 1845.

[8] Rice does not give his port of embarkation, but it presumably was either New York or Boston.

where he spent six weeks. Slowly returning home again, by the Cape of Good Hope, he passed his twenty-first birthday in view of Table Mountain. To celebrate this event on May 26, 1850, the ship hove to and to "fishing we all went and with very good success." "What an original and successful way," wrote Rice, "of passing an exceedingly dull day." This time it took one hundred and seven days from the West Coast to New York.

Back home in Boston and apparently recovered from his ill health. Rice decided to study medicine, a subject he had always liked.[9] In November of 1850 he entered the Harvard Medical School where he remained for the next three years, graduating in May, 1853.[10] Of his life there we have no particular record nor is it too clear what happened in the two years after his graduation. He went to Europe to study, but how he spent his time is not known.

Rice returned home in 1854 and moved from Boston to New York to begin practice. He soon was writing for medical publications and eked out his income by serving as a physician to a mercantile company. He met Morton in June, 1858, Rice then being twenty-nine years of age, and decided to help Morton write the account of the "discovery of etherization." Once accomplished, Rice turned back to his practice until interrupted by the Civil War, a crisis which led to more adventure in Rice's somewhat unusual career.

In April, 1861, Rice began to examine recruits in New York for a cavalry regiment. During that summer he joined the Eighteenth New York Volunteers and remained with them until June, 1863. He was mustered out of this regiment at that time, after having been captured by and escaped from rebel cavalry, but immediately became a surgeon of brigade to another and remained in the Army until September, 1865. He was with the Army of the Potomac for two years and served as Medical Director of the Army in North Carolina and Virginia. In 1864 he had a most unusual experience when he awoke one morning in January, "almost completely paralyzed on the whole left side." This episode was vaguely connected with the explosion of a shell at the Battle of Fredericksburg. Rice was treated for over four months at a military hospital in

[9] His mother was the daughter of Dr. Levi Lincoln of Hingham.

[10] The school, then called the Massachusetts Medical College, was in its new building on North Grove Street, adjacent to the Massachusetts General Hospital. Dr. George Parkman had been murdered the year before Rice entered the school and Webster was hanged on August 30, 1850, with 60,000 persons in attendance. More than 5,000 visited "the scene of the murder," the Medical School, in one day.

Annapolis and improved so quickly that he was able to return to duty, although he was never able to serve again in the field. He witnessed a rebel raid on a train from Baltimore to Philadelphia, which he described in detail in a letter to *The New-York Times*, published July 16,1864 in that paper. Rice was brevetted a Lieutenant-Colonel, U. S. Volunteers, August 15, 1865. After being mustered out in September, 1865, he decided not to return to practice as his health did not permit it, being somewhat crippled by the partial weakness of his left side. Buying a plantation in Georgia, in partnership with a friend, Rice intended to become a cotton planter. The experiment was a failure for he and his partner could not make the venture pay. At the end of a year and a half they gave up. Returning to New York in the summer of 1867, a partially disabled retired Army Surgeon, he obtained a position in the New York Customs House. The job lasted only three years when a change of political administration forced him out. Rice then went to New Orleans and became secretary and manager of a company formed to cut a ship canal from Mississippi to the Gulf of Mexico. Again, this turned out disastrously for the company collapsed in two years and he had to return to New York. Rice was again able, through a turn in fortune, to get his old position in the Customs House and there he remained for the next fifteen years in the Bond Department, a staunch Republican who lasted until a Democratic regime, in 1887, again forced him to retire. After that he did no work, living on in New York, closely associated with the Harvard Club. He died in New York after a second attack of paralysis, November 10, 1900, at the age of seventy-one.[11]

APPENDIX 1.

The handwritten notes of Dr. N. P. Rice, in his own copy of the TRIALS OF A PUBLIC BENEFACTOR, *1859, now in the Boston Medical Library.*

June 6th 1858	Dr. Morton, a stranger to me, made the proposal to write for him a sketch of his life & history of the discovery of etherization he to furnish all the materials & be responsible for all the statements personal & otherwise
June 8th	An agreement was drawn up (vide agreem't) & the work was commenced—As the mass of materials was found to be too great to be moved the work at his request was done at his house & under his supervision

[11] *Boston Transcript*, November 12, 22, 1900. *The Sun*, New York, November 12, 1900. *Boston Journal*, November 22, 1900.

August 5th The work was steadily pursued up to this time—when from a request of Dr. Morton to examine—the first portion of the book was put into his hands, he paying for the same $100—

Sept 1st According to the agreement the manuscript was finished. It had been for some time left upon the table of Dr M he having full liberty to examine it

Sept 15th Have been constantly at work up to this date making additions & alterations to suit Dr Morton On going to the house I was informed by Dr M that he had sent the Mss to Mr Rich[d] H Dana at Boston for his perusal & opinion on certain points. This was done without my permission, or even without my being notified. Feeling satisfied with the choice of the person, I made no objections, but wrote to Mr Dana, explaining the manner in which it was sent & the character of the advice wished. *This letter was given to Dr M to send*

Sept 16th Dr Morton requested me to write a permission for Mr Dana to examine as he stated that he was so particular that he doubted if otherwise he would consent to read—This I wrote & gave him

Sept 18th Dr Morton left the city & went to Connecticut giving me to understand that he should return on Monday the 20th

Sept 22nd Dr Morton did not return—the brother in law of Dr M informed me that he was not to return for a week & that my Mss had not gone to Boston but was in the possession of Dr M in Conn—Wrote to him at once as did his brother in law—to come at once to the city—as I was compelled to leave in a few days & wished to see him before going—

Sept 24th Dr Morton neither coming to the city nor replying to the letters—and no answer coming from Mr Dana I wrote again to Dr Morton (vide letter) expressly forbidding anyone but Mr Dana to read the Mss or any alterations to be made—& demanding the return of the manuscript to my house

Sept 24th Left this city for the north part of New York

Sept 26th The manuscript not having been returned a friend of mine (Mr. Whitney) called upon Dr M & demanded it—but it was refused—

Oct 1st Dr. Morton carried the Mss to a publishers (Messrs Pudney & Russell) & representing that it was all important it should appear at once as an opposition book was daily expected—induced them to work night & day to complete it, he agreeing to pay them in cash as soon as it was done—

Oct 16th 500 copies being printed & 100 bound Dr Morton carried off the 100 bound ones which he sent to various papers—private individuals & over the country—

Oct 17th I returned to New York—

Oct 18th Called in the evening upon Dr Morton & for the first time was informed of what had been done Found my name upon the title page which I had never intended—a name given which I had never intended, portions which I had not written re-added

Oct 19 Went & secured a copyright for the book.—Called upon the publishers—& forbid my name to be continued on the title page—& requested them to notify all the newspapers not to advertise or review In the evening called upon Dr M to try to arrange with him, but found him wholly disinclined to talk with me. Finally he agreed to refer to Mr George Ripley—at whose house that evening we talked the affair over—Mr Ripley coincided wholly in my view & stated very plainly to Dr Morton what course he ought to persue—Dr M seemed perfectly satisfied with the result. I agreed to correct the proof sheets—But to have full power to bring out the book as I chose—

Oct 20th Dr M refused me possession of the Mss so that I could make the corrections

Oct In the hope of an amicable arrangement, a new agreement was drawn up between us (vide agreement)

Oct 30 The Mss having been given me all the corrections were completed—& the corrected copy was deposited subject to my order in the safe of the publisher

Nov 8rd The corrected copy was handed to Mr John L. Develin by the publishers for his legal opinion as to whether the book was too libellous to be published

Nov 4th— Mr Develin gave his opinion. Dr Morton was informed by the publishers that the book could not be published until they had been paid

Nov 5th Dr Morton carried away the *corrected copy* he having represented to Mr Develin that he was to take it to the publishers at their request

Nov 10th The publishers notified Mr Develin that they should hold him responsible for the return of the manuscript

Dec During all the rest of November—various expedients were tried to arrange the difficulty—to secure the money—& bring out the book—but all were unsuccessful—He declaring that he had no money & refusing to take any steps by which it could be had Towards the latter part of the month, being perfectly discouraged, & the publishers being afraid of losing their investment—I agreed to transfer to them my copyright & all my interest in the book upon condition that they should assume the debt of Morton to me. This they agreed to do on condition that I should take my money from the sale of the book (not profits) or from any funds that might in any way come into their hands On the same day Morton made an assignment of his claim for $1500 upon the Board of ten governors* to the publishers

Dec 27 I went to Boston

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* This was the Board of Ten Governors of the Almshouse (Bellvue Hospital), New York. See, *Trials*, pp. 438-442. (H. R. V.)

Jan 1st 1859 The election for the presidency of the board of Governors took place but the new president still refused to sign the check in favor of Morton

Jan — The publishers asked me to pay my portion of a suit against the Governors—this I refused unless my name were taken from the book—

Jan — A suit was commenced against the board—The question was referred to Messrs Bustead & Evarts for an opinion

Feb 14 The book approved & was offered for sale in all the stores—

APPENDIX 2.

Letter to Richard H. Dana, Jr. from Dr. William T. G. Morton, September 17, 1858, now in the Massachusetts Historical Society.*

34 Washington Square
New York, Sept. 17, 1858

R. H. Dana, Esq.—

Having considered it very important to submit to you everything I wish to publish pertaining to the Ether Discovery I asked you after I had formed the determination to publish the work alluded to in the enclosed letters if you would undertake to read it to which you replied that you would either do so or set aside a time when you would hear an editor read it.

In pursuance with this I mentioned my desire to Dr. Rice who also felt desirous of having your opinion.

The manuscript having been put in my hands I transmitted it with a letter to you but upon reading the Doctor's which he desired to write you after I informed him that I had sent it to you I feared you might hesitate to read it on account of his apparent surprise and asked him to address me the note enclosed which I desired returned.

The Doctor's letter however suggested to me that I had imposed upon you a larger task than I at first thought. I had written you and transmitted the manuscript and letter but concluded to instruct the person in whose custody it was to retain it until I could learn from you whether it would not be desirable to have it put in print first.

Should it occupy considerable time for you to read the manuscript it might be cheaper to have it set up in type first and then lose what you should happen to

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* Richard H. Dana, Jr. (1815-1882) was counsel for Dr. Morton. He took depositions of witnesses and filed them in court. In a statement by his son, Richard Henry Dana, written in September, 1928 and now in the Massachusetts Historical Society, occurs the following: "The knowledge of these depositions was confined to a few persons, mostly physicians. Morton was anxious that the world should know of his discovery, so he started to write a book explaining it, and wanted my father to help him. My father was too busy to do this but agreed to look over the galley proofs but not to go over the original manuscript."

strike out or over run where you made additions. It is hardly probable that you would add much.

I shall however be able to form an opinion satisfactory to me if you will reply to the following questions.

1. How long a time will you probably keep the manuscript.
2. How much money must I send you with it and within what sum would your charge probably be in full.
3. How long a time would you keep it if it was in print and
4. How much money must I send with the book printed and within what sum would your charge probably be in full.

One object in asking about the time is to know if we could save considerably by that if so that is still another argument for having it put in print. Because we are desirous to have it go to the public at the earliest possible moment, as Dr. Rice is obliged to read the proof sheets he cannot engage in anything else until it is off from his hands and I wish it out for various reasons.

Yours, with becoming respect

Wm. T. G. Morton.

APPENDIX 3.

Editions of the Trials of a Public Benefactor.

A. Trials / of a / Public Benefactor, / as Illustrated in the / Discovery of Etherization. / By / Nathan P. Rice, M. D. / line / New York: / Published by Pudney & Russell. / line / MDCCCLVIII. [2], [i]-viii, [xiii]-xx, [13]-460. "Press Copy," as indicated by printed slip pasted in front of book, without copyright, portrait and other illustrations, chapter headings, and with irregular numbering of preliminary pages.

Copies. Boston Medical Library.

B. Trials / of a / Public Benefactor, / as Illustrated in the / Discovery of Etherization. / By / Nathan P. Rice, M. D. / line / quotations from Shakspeare and Burns / line / New-York: / Published by Pudney & Russell. / line / DMCCCLIX. [2], [i]-viii, [xiii]-xx, [13]-460.

Copyright, 1858, by Nathan P. Rice, M. D., in the Clerk's Office of the District Court for the Southern District of New York. New title-page. Portrait (frontispiece) and two illustrations. The portrait is a fine unsigned, engraving. The first illustration, opposite page 63, showed Morton giving ether on a sponge to Eben H. Frost sitting in a chair, presumably on the afternoon of September 30, 1846. It was engraved by G. R. Hall. The second, opposite page 92, shows Morton giving ether with an inhalor to Gilbert Abbot, surrounded by seven physicians from the Massachusetts General Hospital, on October 16, 1846. The engraving is skillfully done by H. B. Hall. A third illustration occurs in most copies, a double page engraving, between pages 218-219, showing the obverse and reverse of the *Prix Montyon* medal, given to Morton in 1850. The same errors in pagination occur, as in the "Press Copy."

The book shows every evidence of being hastily compiled. The material is badly organized and there is no index. Morton was responsible for the title and probably much of the non-factual text, the sentimental "trimmings" and style of martyrdom. The great value of the book lies in the letters that it contains, thus preserving for posterity much that might otherwise have been lost.

APPENDIX 4.

Association Copies of the TRIALS *in the Boston Medical Library.*

Copies. 1. N. P. Rice copy, with notes.

2. Henry I. Bowditch copy, with letter from Theodore Metcalf to Dr. Bowditch, Boston, December 1, 1869, indicating the part he played in Morton's 'discovery.' Also, a reprint from the *Boston Medical and Surgical Journal*, November 18, 1869, giving details of Morton's burial at Mt. Auburn and copies of important letters of J. C. Warren and others.

3. "M. S. Perry, M. D., with the kind regards of W. T. G. Morton," on flyleaf, in Morton's hand. Contains a written notation by Samuel A. Green, M. D. September 17, 1910, stating that Morton had given him this copy, although originally intended for Dr. Perry. Perry died in 1859, presumably before Morton had time to send him the book.

4. "John Jeffries, M. D. with the kind regards of W. T. G. Morton," on flyleaf, in Morton's hand.

5. "Oliver W. Holmes, M. D., with kind regards of W. T. G. Morton," on flyleaf, in Morton's hand.

PHILADELPHIA 1846: MEN AND EVENTS THAT INFLUENCED THE DEVELOPMENT OF ORGANIZED MEDICINE

MAURICE S. JACOBS

The year 1846 has been dubbed by Bernard De Voto, the brilliant social historian, the Year of Decision. For him it had significance as a decisive year in the history of the United States because of such events as the Mexican War, the great Oregon and California emigrations, the conquest of New Mexico and later of California and because of men and groups who were trail-blazers and who helped, albeit unknowingly, to lay the foundation for the future expansion of our country. This year saw the election of the first " dark horse " to the Presidency, James K. Polk.

For us, the year 1846 assumes importance because out of the Philadelphia of that day there came a group of men and circumstances that shaped the future of medicine. If we look at the City of Brotherly Love of one hundred years ago, we find it the literary center of the country. That it was the medical center, then as now, is of course well known. Though the city was quiet and not showy, and visitors even considered it dull, it ranked first in size having a population of 120,000 a little over one quarter the population of the entire country. To some the inhabitants seemed distant and unsocial but the city was none-the-less the cultural center of the country. And the country, mind you, in 1846 had less than thirty states, and huge tracts of land were labeled on the map simply as Oregon, California and New Mexico though they included most of the states between the continental divide and the Pacific Ocean. Looking briefly at the country as a whole, we find in this year of 1846 the Mexican War being fought, though the average person living in the east seemed hardly to know anything about it. If there was much of medical import it failed to reach the medical journals. De Voto tells of the encampment at Corpus Christi commanded by Lieutenant Colonel Ethan Allan Hitchcock, in these words: " He succeeded in giving a destitute mob far from its base something like food and shelter, something like organization, and even something like discipline, if not much like it. He could not give his superior officer intelligence about the whereabouts of the enemy, nor could he give his own forces morale. They drank bad water and sickened; they drank bad whisky and brawled. Their rations gave them scurvy (despite the fact that the

cure for scurvy had been discovered about one hundred years earlier). The food they bought from sutlers and Mexicans gave them dysentery. Two thousand camp followers, gamblers and whores got their money. Officers made of themselves ' public scandals ' which Hitchcock dealt with as best he could despite his own serious illness which Dr. Beaumont, the famous observer of Alexis St. Martin's gastric juice had been unable to cure in St. Louis." Political contention was running high with the Democratic and Whig Parties as bitter towards each other even as the Democratic and Republican parties are today.

The machine age was coming into being, and manufactures were increasing despite the conflicting reasons given therefore by the two parties and despite also the Walker revenue tariff.

John Chalmers Da Costa, writing of that period in 1898, states that " the great trade union movement was becoming formidable and organized labor was assuming a peremptory attitude in its demands." One wonders what he would have said of the actions of the irresponsible union leaders of today. While it is difficult to picture the country as a whole, we can visualize the city as it was one hundred years ago. It covered a much smaller area since consolidation of the various districts had not yet occurred. Philadelphia consisted of the city proper and the surrounding districts and townships e. g. Frankford, Kensington, Germantown, Southwark, Moyammensing, Weccaco, Kingsessing and Northern Liberties.

The city, as has been stated, was the medical center of the country, its medical authorities being revered far and wide, the crowning achievement in a doctor's life being a chair in a Philadelphia college. There were then as now five medical schools in the city; the University of Pennsylvania had about five hundred students, the Jefferson Medical School four hundred sixty students, the Pennsylvania Medical College ninety students, the Philadelphia College of Medicine ninety and Franklin Medical College about forty. The last three are of course now defunct, having been replaced by Women's Medical College in 1850, Hahnemann Medical School in 1869, and Temple University Medical School in 1901.

The students who attended these medical schools were influenced by such men as Dr. George B. Wood, a famous teacher, a celebrated author and practitioner and the founder, with Dr. Franklin Bache, of the National Dispensatory. At the time of which we speak he was not yet fifty years of age, yet was physician to the Pennsylvania Hospital and professor of therapeutics in the University and was later to succeed Chapman as professor of physic.

John Kiersley Mitchell was the professor of practice at Jefferson College, a medical philosopher and a famous man. No man was ever loved more by his patients and his students. Like his famous son, he was a versifier of no mean power, a fine public speaker, a chemist, a physiologist, a scientific author and a most successful practitioner. "In his essay on the Cryptogamous Origin of Malarial Fever, with the inspiration of the poet and the prescience of the philosopher he anticipated many of our present views regarding the action of fungi in producing disease." This remarkable essay is found in the *American Journal of Medical Sciences* for 1849. He was one of the first to point out the value of rest in spinal troubles.

Nathaniel Chapman, the professor of practice in the University, was a learned, brilliant and eccentric man. His witty sayings were celebrated, and to listen to the conversation between Chapman and his particular friends, Godey and Judge Conrad, was a privilege to be sought for. He had been a private pupil of Rush, and had also studied under Abernethy, in London. He held the chair of practice in the University for thirty-four years. He was physician to the Philadelphia Hospital, the first president of the American Medical Association, and the first editor of the American Journal of Medical Sciences. He wrote a work on therapeutics and materia medica, and many of his lectures were published in book form.

Charles D. Meigs was professor of obstetrics in Jefferson. He was a learned, scholarly man of marked versatility. He was dramatic, eccentric, witty, lovable and much given to interesting stories. Although he was a most kindly, conscientious and redoubtable man, he was not one to accept newer concepts graciously. He had a famous controversy with Holmes regarding the contagiousness of puerperal fever, and maintained that chloroform was a very dangerous agent.

William Gibson was the professor of surgery in the University. He was an able surgeon, a classical scholar and a learned man, but of a violent and passionate temperament, which led him into innumerable quarrels. He was the first surgeon to tie the internal iliac artery.

Robley Dunglison was the professor of physiology in Jefferson. He was not original, but was considered the most learned man in the medical profession of America. His knowledge was encyclopaedic. He wrote quite a number of successful works. His *Medical Dictionary* and his *History of Medicine* are still frequently consulted. He was born in England, and had begun practice in London as an obstetrician, when Thomas Jefferson brought him to the University of Virginia in 1824. He came to Philadelphia in 1834.

Thomas D. Mütter, then only thirty-eight years old, was professor of surgery in Jefferson. Gross says " he was of medium height, slender, and graceful in form, with bright eyes and a handsome forehead. His voice was remarkably clear and distinct and had unusual strength and compass." He was a follower of the French School of Surgery, and was particularly noted for plastic and orthopaedic operations. He was not an original man, he wrote but little, and in operating was prone to lean somewhat on the strong arm of Joseph Pancoast.

Joseph Pancoast, the professor of anatomy in Jefferson, was one of the most remarkable surgeons of the day. It was as an operative surgeon that he was at his best, rather than in the library or the lecture room, and Keen has said that he shared with Bernard von Langenbeck the distinction of being the greatest operator of the time. He was bold, brilliant, resourceful; his anatomical knowledge was perfect, his steadiness of hand and keenness of eye were proverbial, and he was a successful clinical teacher. His work on operative surgery was fiercely attacked by the critics, but it was a success.

Alfred Stillé was a prominent teacher of pathology. Although still a young man he helped to differentiate typhoid from typhus fever confirming the work of Gerhard. He was named first secretary of the American Medical Association.

Dr. Samuel Jackson was a man of great intellect and learning. He was not only learned but was wise. He was more than a practitioner, he was a medical philosopher. He was a delightful lecturer and a very eloquent speaker. He was for many years professor of the institutes of medicine in the University.

These then were some of the leading scholastic lights in the cradle of medicine a century ago. But they were by no means the only men of vision and foresight. There were others who saw the trends in medical practice, men who were influenced to a large extent by the writings appearing in the leading medical journal of its day, even as it is one of the leading ones yet, *The American Journal of the Medical Sciences*, edited by another Philadelphian, Isaac Hays. In addition, while journals and books from Europe were slow in getting here, when they did arrive extensive abstracts and resumés filled the pages of our own periodicals. Against such a background we find charlatanism, quackery, bigotry and fadism going on at a merry pace. In addition the medical schools had no standards and the teaching in the different schools varied to a marked degree. There being no supervision some medical schools granted degrees after only two years

of " schooling," there being only two sessions of four months each a year. It is scarcely any wonder that the training was unsatisfactory. And it is also little wonder that nostrums were widely advertised and promoted. Let us look for example at the *Public Ledger* of December 5, 1846. We find almost a quarter of the four pages taken up with nostrums and quack remedies, some of which even actually still exist:

" We have used Dr. Jayne's Compound Syrup of Wild Cherry in our own family and find it one of the most soothing and agreeable remedies for coughs, inflammation of the throat, lungs, etc., that we have tried, and have no hesitation in recommending a trial of it to those who have occasion for such a medicine. We do this of our own free will, without the knowledge of Dr. Jayne, or any of his agents, or any suggestions from them." Only prepared by Dr. Jayne, Number 8, South Third Street, Philadelphia. Also for sale by R. Shoemaker, corner of Second and Green Streets. Volume XXII. *Ledger* Number 63. December 5, 1846.

Some of these " other men " just alluded to saw fit therefore to get together on this December 5, 1846, probably at the instance of Dr. Wilson Jewell, a leader in Philadelphia medicine, at a meeting of physicians residing in the northern portions of the City, County of Philadelphia, held in pursuance of an invitation, at the Northern Dispensary on the evening of the 5th of December 1846, for the purpose of considering the expediency of organizing a Medical Association. Present were Drs. Janney, Jewell, Uhlin, Levis, Hatfield, Knorr, Steward, Keichline, Townsend, Reilly, Passmore, Taylor, Rhein, Hobson, Remington, Towns, Heffenstien, Bryan Hart, Bibighans, I. A. Patterson, E. G. Smith, Wilson, Crowley, Mayburry, Naudain, Bodder, M. B. Smith, Yardley, Leiper, Handy and G. W. Patterson.

After some preliminary observations by Dr. Wilson Jewell on the advantages and marked benefits to be derived from thus meeting together at stated periods for the reading of Medical Essays and the discussion of subjects connected with our profession; the following Preamble and resolution offered by Dr. Jewell were read and adopted. " Whereas, concert of action is at all times necessary for the successful prosecution of any object; and whereas the improvement of the Science of Medicine, the promotion of our usefulness as Medical Practitioners, the preservation and advancement of our interests and honor as Members of the same fraternity are objects deserving our highest regard, and cannot be better secured than by cultivating opportunities for Social Scientific and literary intercourse; therefore Resolved: That we proceed to organize a Northern District Medical Association for the improvement of our profession."

On motion of Dr. Janney a committee consisting of Drs. Janney, Jewell,

Yardley, Remington, Levis, Naudain and Hatfield was appointed to draught a Constitution and By-Laws for the government of the association and submit the same for consideration at the next meeting.

Thus was organized the Northern Medical Association, taking its name from the Northern Liberties district which was on the outskirts of the old city less than a mile from Market Street, then called High Street, which was in the center of the city. At a second organization meeting a month later the constitution was adopted after the Committee read its report "article by article and after free discussion and mature deliberation."

The object as stated in the Constitution was to "cultivate the science of Medicine, and to promote harmony among its members."

One may well ponder the latter half of this simple "object" in Article two. It does not take much stretching of the imagination to see that our medical brethren did not all get along well with each other. To be sure this was more true as between section and section than between men in one vicinity. Thus those living south of Market Street and attached to the Pennsylvania Hospital did exhibit a rather patronizing attitude towards the doctors in this northern section whose patients were of the poorer classes. As a matter of fact the lighthouse which guided these young men in their early days of communion was the Northern Dispensary situated first at 1 Spring Garden Street and later at 608 Coates Street (now Fairmount Avenue). Most of the men who formed the association and a great many who subsequently joined were graduates, so to speak, of the Northern Dispensary which was one of the free dispensaries catering to the poor in the vicinity. The Northern Dispensary was an offshoot of the Philadelphia Dispensary begun by such men as Benjamin Rush, Adam Kuhn and Shippen. In 1816, the work having become too much for one dispensary, independent branches were organized. Thus the Northern and Southern Dispensary were opened. For a century the Northern Dispensary catered to an ever-growing population until in recent years its function was usurped by several hospitals. Furthermore the industrialization of the city made a dispensary in this location untenable. However during most of its active life, the younger men who joined the Northern Dispensary became members of the Northern Medical Association and contributed largely to its growth and standing in the community.

But to get back to the origin of the Northern Medical Association—Who was eligible to join? Article 3 states: Any physician of respectable standing in the profession, of good moral character and temperate in his habits, shall be considered eligible for membership; provided, he does not

give his support to any system of practice, which has a tendency to weaken or destroy public confidence in the science of Medicine, or in the medical profession; or by advertisement, announces his claim to superior qualifications in the treatment of any disease; or holds a patent, or part of a patent, for any article to be used in surgery or medicine; or gives a prescription to any apothecary which he refuses to give to others, or publicly recommends or deals in secret medicines.

Thus was the society constituted and at the first election held on January 14, 1847 the following men were elected: Dr. Janney was elected President, Dr. Naudain, Vice-President, Drs. Yardley, Hatfield, and Uhler were nominated for Counsellors, Dr. M. B. Smith, Treasurer, Dr. Remington, Secretary, Dr. Townsend and Bryan, reporting secretaries.

The first scientific paper was read by Dr. Wilson Jewell who delivered " an able and interesting communication on ' Shortened Funis Umbilicalis as a cause of difficulty in paturition.' " The minutes record that " after an animated discussion in which many members participated the subject was dismissed."

Several interesting notes appear in one of the earliest minutes to the effect that on motion it was resolved that the secretary be authorized to procure a Ballot Box and Balls for the use of the Society. (They apparently took their voting more seriously than we do today.) There being no organized mail service, as yet, the secretary was furthermore authorized " to employ some person at a fair compensation to serve notices." Later they were to graduate to Blood's postals.

In May 1846 a medical convention was held at New York University, which resolved, " That it is expedient for the Medical Profession of the United States to institute a National Medical Association." A committee of seven was appointed, consisting of Drs. John Watson, John Stearns, and F. Campbell Stewart, of the city of New York: A. Stillé of Philadelphia; N. S. Davis, of Binghamton, N. Y.; W. H. Cogswell, of Plainfield, Connecticut; and E. D. Fenner, of New Orleans, " To report a plan of organization for such an association, at a meeting to be held at Philadelphia, on the first Wednesday in May, 1847." The said committee, after carefully deliberating on the business entrusted to them, reported a plan of organization for a national medical association in Philadelphia in May, 1847. Whereas, the Medical Convention, held in the city of New York in May, 1846, have declared it expedient " for the Medical Profession of the United States to institute a National Medical Association "; and,

Inasmuch as an institution so conducted as to give frequent, united and emphatic expression to the views and aims of the Medical Profession in this country, must

at all times have a beneficial influence, and supply more efficient means than have hitherto been available here, for cultivating and advancing medical knowledge, for elevating the standard of medical education, for promoting the usefulness, honour, and interests of the Medical Profession; for enlightening and directing public opinion in regard to the duties, responsibilities and requirements of medical men, for exciting and encouraging emulation and concert of action in the profession, and for facilitating and fostering friendly intercourse between those who are engaged in it;—therefore,

Be it resolved, in behalf of the Medical Profession of the United States,—that the members of the Medical Convention held in Philadelphia, in May, 1847, and all others who, in pursuit of the objects above-mentioned, are to unite with, or succeed them, constitute a National Medical Association;—and that, for the organization and management of the same, they adopt the following REGULATIONS.

This institution shall be known and distinguished by the name and title of "The American Medical Association."

The members of this institution shall collectively represent and have cognizance of the common interests of the medical profession in every part of the United States; and shall hold their appointment to membership either as delegates from local institutions, as members by invitation, or as permanent members. [It is interesting to note that the complexion of the American Medical Association was somewhat different, at the time of its origin, from what it is today. There being no component state and country societies as yet, membership came from already constituted groups. Thus it was arranged that] the delegates shall receive the appointment from permanently organized medical societies, medical colleges, hospitals, lunatic asylums, and other permanently organized medical institutions of good standing, in the United States. Each delegate shall hold his appointment for one year, and until another is appointed to succeed him, and shall participate in all the business and affairs of the association.

Each local society shall have the privilege of sending to the association one delegate for every ten of its regular resident members, and one for every additional fraction of more than half of this number. The faculty of every regularly constituted medical college or chartered school of medicine, shall have the privilege of sending two delegates. The professional staff of every chartered or municipal hospital containing a hundred inmates or more, shall have the privilege of sending two delegates; and every other permanently organized medical institution of good standing shall have the privilege of sending one delegate.

Thus chiefly through the efforts of Nathan Smith Davis of New York City, the first steps of organizing a national society were begun. The chief reason for this organization was to improve the then disgraceful status of medical education. That the leading educators themselves realized the status of medical education in America a hundred years ago is evidenced by the active interest taken by many of them in fostering the new organization. Thus, as has already been mentioned, Dr. Alfred Stillé was one of the founders and the first secretary.

The second convention was held in Philadelphia in May, 1847 and to

this delegates were sent in accordance with the outlines above mentioned. Besides the medical schools of Philadelphia, the newly formed but vitally active Northern Medical Association sent delegates. Under the impetus again of Wilson Jewell five delegates were elected to represent the society, at what was to become the actual organization meeting.

It was at this meeting that Dr. Nathaniel Chapman, of the University of Pennsylvania, was elected the first president.

One can hardly realize the condition that the medical schools and medical practice found themselves in 1846. Thus one of the first and perhaps the most important task embarked upon by the newly formed American Medical Association was an analysis of existing medical schools and medical practices resulting in a courageous and far-reaching report which became a beacon light for the world to follow.

Of the seven men appointed to a committee to study these conditions and render a report on the improvement of standards of medical teaching, one was Dr. George W. Norris of Philadelphia. He was one of a long line of Norris's at the Pennsylvania Hospital. Extracts of this report show how far-reaching were their conclusions and how correct were their recommendations. Its object was the adoption of a uniform and elevated standard of requirements for the degree of M. D. Although the language is somewhat flowery it is interesting to give the report in some detail as it serves to emphasize the differences which existed between schools in this country and abroad. Furthermore, it is important in that it ushered in the complete medical curriculum which sounded the death knell of private lectures, preceptorships, apprenticeships etc.;

> The ceaseless and unwearied exertions of the master-minds of the profession, constantly urging on improvement in the various departments of medicine, have elaborated a work which it will require years of toilsome study justly to appreciate; and while we are far from indulging the Utopian idea that the newly graduated student is to be immediately transformed into the accomplished physician, yet do we believe from the complaints which spring from almost every quarter, that lamentable deficiencies do exist, and that these deficiencies should be corrected. The same spirit of reform existed in Great Britain and France. The term of study has been prolonged; other branches of medical education have been added and more frequent and rigid examinations have been adopted by which to test the qualification of the candidate.
>
> We are free to confess that within the last twenty or five-and twenty years, medicine has been better taught among us than at any former period. It is difficult to imagine, indeed, that the progressive efforts of foreign lands should pass wholly unnoticed in this; and while their example has been productive of some improvement, much yet remains to be accomplished. It is unquestioned that the facilities for education have been augmented not only in the public schools of the country,

but private enterprise has exerted no slight influence in the attainment of this end. But let us not remain stationary while the interests of society and the profession impel us to further advancement.

If we discard the preliminary education demanded of students in Europe, and confine our attention to the branches actually taught in the medical schools, it will be perceived that the deficiency on our part is sufficiently apparent. All the branches which we profess to teach are taught by them; in addition to which we may enumerate the several subjects of Zoology, Botany, Comparative Anatomy, the History of Medicine, Hygiene, Medical Physics, and Clinical Medicine and Surgery. We find that in France and Austria, the term of lectures is extended to a fraction more than four years; in Germany to three years and four months; in Great Britain to two years, while in the schools of our own country, two sessions of four months each are alone sufficient to entitle the candidate to an examination. Although thus rapidly and most imperfectly enumerated, we have thought it not inappropriate to the subject to mention the requisitions which are demanded in foreign schools. They either exact of their pupils an unnecessary standard of requirements, or we, on the contrary, are satisfied with too low a grade of qualification. Which alternative is this convention prepared to adopt? Are we willing to assert, and maintain the opinion that he who has passed eight months within the walls of a medical college is as well fitted for the practical duties of his profession, as he who has devoted years to more extended studies? Assuredly we cannot advocate a proposition so absurd. Nor, perhaps, is it at all requisite to occupy the time of the convention with a long detail of arguments in order to prove the necessity of some measures of reform. In regard to the two subjects of preliminary education and mode of examination, this committee has nothing to do. But being charged with the duty of reporting upon a uniform and elevated standard of requirements for the degree of M. D., whatever alternation in the present system it may recommend, will more immediately bear upon the interests of school. Yet let it not be supposed, as some we fear have imagined, that the object of this committee, or of this convention, is to attack with a ruthless hand the institutions of the country, rendered venerable by time, or that still larger number whose charters have been obtained at a more recent date. We are aware that many obstacles are opposed to the successful prosecution of the several matters upon which we have assembled to deliberate. With no National Legislature to regulate our Medical Institutions, and with a reckless indifference to their concerns too often practised by our State Governments, each has endeavoured to build up for itself, if not an enduring reputation, at least a long catalogue of names. And the colleges themselves resting secure in their chartered rights, may contend against any interference with their several systems of education; although we would fain indulge the hope that some among them stand prepared to listen to that voice which rarely speaks in vain—the voice of public opinion. To correct these evils it is indispensable that the standard both of preliminary and of medical education should be elevated; and as we have said before, let no institution fear to commence the laudable undertaking.

We believe the opinion defensible, that in no profession is it more difficult to arrive at just conclusions, as to real merit, than in that of medicine. And hence there devolves upon those who are most competent to judge, and who have the best opportunity for judging, a vast responsibility to see well to it that none but the

truly meritorious should be admitted to the profession under their sanction. From the fact that society cannot in this respect adequately protect itself, the Teacher in Our Medical Schools should exercise a guardianship the more watchful, a jealousy the more keen, and a firmness the more unyielding.

The most beneficial consequences may also be expected from the efforts of private Preceptors. The position can scarcely be controverted, that a proper inquiry into the fitness of young men to become Students of Medicine is but seldom instituted; and numbers have been admitted into the offices of their Preceptors who were deficient even in the most common branches of an English education.

In entering upon the principal purport of this report, it is deemed advisable to remark, that in order to obtain a knowledge of the requirements demanded by the various schools of the country, a letter was addressed to all whose existence was known to your committee, requesting them to furnish the desired information. These consisted thirty-three in number; and answers were received from nineteen, being a fraction more than one half. In the majority of instances pamphlets were forwarded to the chairman, containing the rules and regulations of the college, together with the branches taught; while from others, letters were received simply stating that two full courses of lectures were demanded, that the candidate must be twenty-one years of age, of good moral character, etc. From this correspondence but little available information was derived. A circular was then dispatched. In summing up the information obtained from the nineteen colleges, it will be found that the number of students belonging to these institutions during the session of 1845-6 amounted to two thousand five hundred and forty-four, including thirty-one non-paying pupils; and that the number of graduates was seven hundred and thirty;—the number of professors varies from three to eight. It will be seen that the nineteen colleges which noticed our circular, report the aggregate number to be two thousand five hundred and forty-four; and if it be proper to assign the same ratio to the fourteen which did not, the whole number of students during the session of 1845-6, will be found to be four thousand four hundred and eighteen and a fraction. To the classes of graduates, we reach the conclusion that a fraction less than thirteen hundred were added to the already existing number of physicians, in the spring of 1846. The very large number of physicians in the United States, a number far larger in proportion to its population than in any other country perhaps of which we have a correct knowledge, has frequently been the subject of remark.

The shortness of the time allotted to the delivery of Lectures, we believe to be an evil of no small magnitude. It is next to an impossibility, that the strongest intellect can receive and well digest some half a dozen discourses or more a day, embracing subjects which have oftentimes little or no immediate connection with each other.

In regard to the branches to be taught, it is not improbable that the recommendation of the Committee may not meet the views of some of the members of the Convention. This subject was freely canvassed by the Committee, and the opinion was general that in the commencement of our effort to reform the existing condition of things, too high a standard of requirement ought not to be immediately insisted on. The conclusions to which this Convention may come upon any subject, cannot be forced upon the schools contrary to their wishes. The National Medical Association, contemplated under the first two resolutions adopted at the meeting in

May last, which it is to be hoped will convene from time to time in different parts of the country, can legitimately exercise the same influence which we now seek to do; and when in after time it may be deemed advisable to add new subjects of instruction, it will not hesitate to express its opinion. Under this view of the matter, your Committee advise that lectures be given on the following branches, in all the Colleges: viz., on the Theory and Practice of Medicine; the Principles and Practice of Surgery; Materia Medica; Therapeutics and Pharmacy; Midwifery, and Diseases of Women and Children; Chemistry and Medical Jurisprudence. These subjects, it is true, are now taught in the majority of our schools. With a lengthened period for teaching, a double advantage will be gained; a wider extent of information may be imparted to the student, while his time will be occupied with fewer lectures during the day. It is believed, however, that a slight augmentation in the number of Professors will become necessary.

In regard to clinical instruction, your Committee would willingly have made it a requisition to the attainment of the diploma; but an insuperable difficulty seemed to exist. It is believed that few of the Colleges have Hospitals attached to them, and in very many instances where such Institutions exist in the cities, the Professors do not receive the appointment of attending Physicians and Surgeons. Consequently, the opportunity is lost to them of imparting such instruction as would be valuable to the student.

One can hardly resist the temptation to say " bravo " to the analysis so fearlessly and critically made a century ago. As a result of their deliberations the committee offered the following resolutions to the Convention for adoption:

Resolved, 1st. That it be recommended to all the colleges to extend the period employed in lecturing, from four, to six months.

2nd. That no student shall become a candidate for the degree of M. D. unless he shall have devoted three entire years to the study of medicine, including the time allotted to attendance upon the lectures.

3rd. That the candidate shall have attended two full courses of lectures, that he shall be twenty-one years of age, and in all cases shall produce the certificate of his preceptor, to prove when he commenced his studies.

4th. That the certificate of no preceptor shall be received who is avowedly and notoriously an irregular practitioner, whether he shall possess the degree of M. D. or not.

5th. That the several branches of medical education, already named in the body of this report, be taught in all the colleges; that not less than one hundred lectures be delivered by each Professor, and that the number of Professors be increased to seven.

6th. That it be required of candidates that they shall have steadily devoted three months to dissections.

7th. That it is incumbent upon Preceptors to avail themselves of every opportunity to impart clinical instruction to their pupils; and upon Professors to connect themselves with Hospitals whenever it can be accomplished, for the advancement of the same end.

8th. That it is incumbent upon all schools and colleges granting Diplomas, fully to carry out the above requisitions.

9th. That it be considered the duty of Preceptors, to advise their students to attend only such institutions as shall rigidly adhere to the recommendations herein contained.

All which is most respectfully submitted.

Ro. W. HAXALL, *Chairman*

Of equal importance with elevation of the standards of medical education, was the Code of Ethics promulgated by the American Medical Association. With revisions from time it has stood almost a century as the finest Code by which a fraternity of professional brethren can guide their conduct and their relations with their fellow men. It is at the present time almost taken for granted and serves as a mordant to cement the relations of county, state and national organizations.

It was only natural that with the news of the organization of the Northern Medical Association and the influence of Philadelphia medical men in the formation of the American Medical Association, doctors in various parts of the state began to think more positively about organization in medicine. True there were a few county and borough societies scattered throughout the state, in Lancaster, York, Bucks, Lebanon, Berks etc., but they were by no means strong organizations and frequently were merely social gatherings of physicians.

Early in 1848, the Societies of Chester and Lancaster Counties invited all these Societies to send delegates to the City of Lancaster for the purpose of organizing a State Medical Society. Unfortunately no record of this invitation has been found, so that the writer is unable to show what the chief ideas of those who issued this invitation were. No doubt they had observed the difficulty experienced in the various Societies in the keeping up of the organizations, and hoped by means of a State Society to institute a more powerful aid in the formation of Medical Societies, and the union of these into a harmonious body which would act to attract all respectable physicians to connect themselves with the local bodies. Even as late as the year 1850, there was great objection on the part of many of the more prominent physicians to hold allegiance to any form of medical organization, especially was this the case in the large cities and towns. Living in the light of the valuable results obtained from the many Medical Societies of the present day, it is difficult to realize the heart burnings and jealousies then prevailing. Up to the year 1857, membership was rarely sought, often declined, and for the most trivial reasons. It was hoped that the foundation of a State body would do much to destroy such

impressions, but ten years after its origin, the growth of the County Societies was extremely slow, the State Society itself while meeting yearly, made but little advance, nor was it till after the fearful internecine strife had shaken the republic to its foundations, and the Union had, as it were, risen on its ruins, that the true fraternal feeling began to show itself, last of all among the profession. However, pursuant to this call there assembled in Lancaster, in the Methodist Episcopal Church, a convention of medical men representing the counties, the University of Pennsylvania, the Jefferson Medical College, the Pennsylvania Medical College, the Philadelphia Association for Medical Instruction. The gentlemen representing these bodies deserve the honor of special mention, though space forbids my doing so.

In all sixty-one were present. In looking over this list we recognize men who have aided largely to make Philadelphia and our State famous in medical science. Men then professors in the colleges, men afterwards professors in these schools, men who have revolutionized medical science. Of the sixty-one present at this organization meeting, thirty came from Philadelphia, six of them being members of the Northern Medical Association. Once again we meet the familiar names of the men who were to leave their impress for many years. Philadelphia has from that day to this played an important and often a leading part in the affairs of the State Society. Fully one-third of the presidents, in almost a century of active life, have come from this city. In their original meeting they adopted the following as their raison d'être:

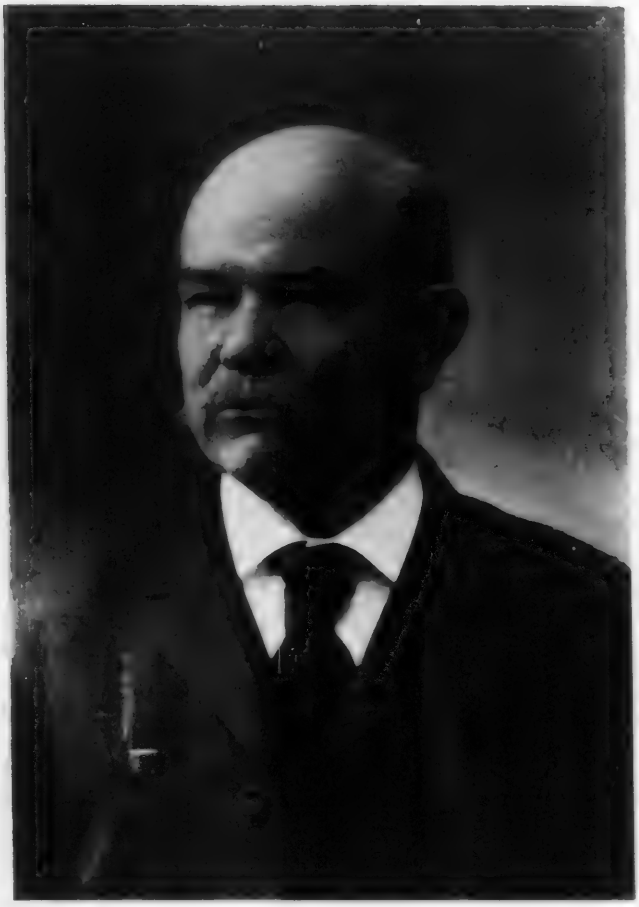
> The objects shall be the advancement of medical knowledge, the elevation of professional character, the protection of the interests of its members, the extension of the bounds of medical science and the promotion of all measures adapted to the relief of suffering and to improve the health and protect the lives of the community.

The Society adopted the Code of Ethics of the American Medical Association previously alluded to.

But this group of far-seeing Philadelphia doctors still had one task of organization remaining, namely the formation of a County Medical Society. Dr. Wilson Jewell, ever in the forefront of medical advance, as he was to be for many years to come, issued a call in December 1848 and in January 1849 the first meeting of the Philadelphia County Medical Society was held. Dr. Samuel Jackson (late of Northumberland) was elected president, a post he held for three years.

Thus we see how events which began in 1846 led to national, state and county societies. Moreover, it probably would not be too far from the

truth to conjecture on the effect of these events throughout the country, in view of the fact that the five medical schools in Philadelphia had about one-fourth of the total number of students in the country. With men of the stature of Chapman, Jackson, Stillé, Patterson, Attlee, Janney and Jewell the impress was bound to be a lasting one.



REGINALD HEBER FITZ

THE CHAPTER ON APPENDICITIS IN A BIOGRAPHY OF REGINALD HEBER FITZ

HYMAN MORRISON

Several months ago at a meeting in New York, Doctor Emanuel Libman asked me how I was getting on with the Fitz biography. I told him that at my present pace I should have to live long to complete it. His comment was that if I did complete it, and did it well, I should live long. His appraisal was correct. Reginald Heber Fitz had impressed his own generation profoundly, and now, in the perspective of an interval of a third of a century, his place in the history of medicine is secure. He was a man of colorful, dynamic personality, an outstanding physician, a forceful teacher and an investigator who gave to the world for the first time definitive, clear-cut, classic descriptions and a positive program for treatment of two important diseases, — appendicitis and pancreatitis.

What turned Fitz to his study of inflammation of the appendix? He answers it in the opening paragraph of his memorable presentation entitled "Perforating Inflammation of the Vermiform Appendix" at the initial meeting of the Association of American Physicians, June 17, 1886, at Washington, D. C.

> It appears that even the most recent systematic writers are by no means agreed as to the exact relation of inflammation of the cecum and that of the appendix to peritonitis and perityphlitis. The vital importance of the timely and appropriate treatment of the disease in question is becoming more and more apparent. Such treatment is often postponed till hopeless, even if its application is at any time entertained. It was, therefore, to be anticipated that the critical consideration of a large number of unquestionable cases of perforation of the cecal appendix might serve to make prominent the features essential for diagnosis and treatment.

Here was a call for understanding and action! It made a profound impression not only on his immediate audience on that eventful day in Washington, but on the entire medical profession. His paper had an electrifying effect in clearing the atmosphere of the confusion which had existed since the teaching of Dupuytren, French surgical authority of the early nineteenth century, that the cause of right iliac abscess was a primary inflammation of the cecum and its enveloping fibrous tissue. This confusion was manifested in the many names applied to the disease : typhlitis, tuphlitis, epi-, peri-, and paratyphlitis, typhlo-enteritis, coecitis, and still

others, and also in the lack of agreement as to what was understood by these terms. Attention was focused exclusively on the cecum, when perforation of the appendix was mentioned at times it was considered a casual secondary event in the course of the disease. Its true role, however, was entirely ignored by the general profession in spite of the fact that a number of individual observers in Europe and in this country had recognized its importance even prior to Fitz. The consequence was absolute lack of rational treatment and a frightful mortality.

Abscess in the right iliac fossa had been encountered even in the classic times; through the ages it was known that severe pain in the right lower abdomen was dangerous, often followed by death. The vermiform appendix, as such, was first described by Vesalius and it was first named by Vidius in the sixteenth century.

Isolated cases of inflammation of this organ had been reported at different times since early in the eighteenth century. The earliest definite post-mortem record of disease of the appendix is that of Lorenz Heister, the foremost German surgeon of the eighteenth century, who in a public dissection of a criminal at Altdorff in 1711, found this organ gangrenous and pus enclosed within the adherent peritoneal surfaces. "This instance may stand as proof of the possibility of inflammation arising and abscess forming on the appendix . . . and when in practice we meet with pain where this part is situated, we ought to give attention to it."

In France, Germany, England and in this country physicians (Mestivier, Melier, Voltz, Parkinson, Hodgkin, Richards, Hallowel and Lewis among them) reported fatal cases of illness of short duration with post-mortem findings of perforation of the appendix. In the second quarter of the nineteenth century individual observers began to deny the teachings of Dupuytren and asserted that inflammation of the appendix rather than of the cecum was the origin of right iliac abscess.

Richard Bright and Thomas Addison, master clinicians, at about the same time, gave clear-cut clinical and pathological descriptions of inflammation of the appendix. "From numerous dissections," they wrote, "it is proved that the fecal abscess thus formed in the right iliac region arises, in the large majority of cases, from diseases set up in the appendix ceci."

Some of the earlier Boston physicians had also met cases of inflammation in the right iliac region. Fitz had read, as did every New England physician then, James Jackson's little classic, *Letters to a Young Physician*, published in 1855. Its author was then in his seventy-eighth year, in his fifty-fifth year of practice, and one of the foremost early American physi-

cians. In the letter dealing with diseases of the cecum and colon, he wrote as follows :

> In my earlier years I noticed, as others have done, that in peritonitis the inflammation was greatest on the right side of the abdomen and in the lower half of it . . . At length, within the last fifteen years, perhaps, I got to distinguish the particular disease which I wish to make known to you. I must give a name to this affliction as it is inconvenient to go on without one; therefore in the present state of our knowledge, I will denominate it a painful tumor near the cecum. [He then cites seven cases] showing, in common, pain and tenderness and deep-seated tumor in the right iliac region with slight fever, differing in their extent, violence and duration; there was no fatality.

In reply to an inquiry on this subject in 1903 by James Jackson Putnam, grandson and biographer of James Jackson, Fitz wrote :

> There is no doubt that Dr. Jackson's "painful tumor near the cecum" was appendicitis, and his descriptions are accurate, even to the determination of McBurney's Point. His observations were apparently original.

Fitz's predecessor in the chair of pathology at Harvard and his former teacher, John B. S. Jackson, "the Rokitansky of America," was among the first in the eighteen-sixties and seventies, as testified by David W. Cheever, Senior, to insist on the frequency of inflammation of the appendix with subsequent fatal peritonitis. "No operative interference was thought of," Cheever went on, "and I can recall five cases, all fatal, whose symptoms of perforation of the appendix were plain and well-marked. Treatment then halted between first, leeching and mercury; second, opium."

And Fitz must surely have seen the specimens in the Warren Anatomical Museum collected by this same teacher of his and listed in his *Descriptive Catalogue,* one of the earliest contributions to pathology in this country. Four were specimens of the appendix from cases of "typhloenteritis" and two of foreign bodies from the appendix occurring between 1849 and 1864 in the practices of several Boston physicians. Brief but definitive histories and post-mortem descriptions are given; there was peritonitis and evidence of perforation of the appendix in all.

In a volume entitled *Surgical Observation with Cases and Operations* by J. Mason Warren, published in Boston in 1867 while Fitz was still a student, there is the report of a man wth recurrent attacks of abdominal pain and a tender tumor in the right iliac region dating back to 1847. The final attack came in June 1851 with death seventy-two hours after the onset. The post-mortem examination revealed extensive peritonitis with the appendix gangrenous and perforated.

A search in the *Boston Medical and Surgical Journal*, published under this name between 1828 and 1928 (and as the *New England Journal of Medicine* between 1812 and 1828 and again since 1928) discloses the first mention of right iliac abscess in a communication in 1847 entitled "Perforation of the Appendix with Peritonitis" by J. Crawford of *Montreal*. By 1886 the "Fitz year," 17 other reports on "typhlitis" and cases with allied nomenclature were published. There were only two recoveries. Post-mortem examination, and Fitz himself performed some of the autopsies, disclosed inflammation of the appendix in all and perforation in all but one. In one case with recovery, reported by F. Gordon Morrill in 1875, there was the history of pain and tumor in the right iliac region with fever and vomiting. The writer ventured to say, on the basis of 18 fatal cases collected from the literature and private practice, that "in all probability the vermiform appendix was the original seat of the trouble, the lodgement of a foreign body its cause." He even stressed the inappropriateness of the nomenclature in view of the prevalent origin of the disease in the appendix.

During his post-graduate study in Vienna, Fitz had come under the influence of two teachers interested in this field, Oppolzer and Rokitansky. The former, however, was still involved in hair-splitting differentiation between perityphlitis and paratyphlitis. Rokitansky, on the other hand, had described catarrhal inflammation of the appendix due either to fecal concretion or to a foreign body, and believed that it might go on to ulceration or to fibrous adhesions, and that the latter condition could localize the peritonitis resulting from perforation of the appendix.

It is apparent then, that in 1870 when Fitz returned home from his study abroad, he, like the medical profession as a whole, was well aware of the seriousness of "right iliac abscess," but even then its nature was not understood except by a very few, and its mortality was still appalling. In 1848 Hancock, a London physician, *did* operate successfully on one case, "a happy exception to the then almost uniform story of disaster." In 1867 Willard Parker of New York reported four cases operated on successfully; he advocated incision if the disease had lasted over five days, "otherwise the prognosis is bad,—the end is death." Still, in 1873, Bull, also of New York, collected sixty-seven reported cases of perityphlitis with a mortality of thirty-two, forty-eight percent, even with surgical intervention.

Fitz was deeply impressed from the very outset by this critically serious problem. Undoubtedly he recalled James Jackson's comment on the query

by a colleague as to whether his " painful tumor near the cecum might not have been typhlo-enteritis, unrecognized as such, in cases which did not terminate fatally? " " This is a fair question," Jackson had said, " and I leave it to others to answer it, if an opportunity occurs." To Fitz just back from Europe where he had been trained to correlate the clinical and post-mortem manifestations of disease, the challenge implied by Jackson was clear, and his new position as pathologist at the Massachusetts General Hospital offered the opportunity.

There followed years of ceaseless activity. Making the most of the opportunity from his vantage point as pathologist, teacher and practitioner, he collected two series of cases of abscess in the right iliac fossa, under the miscellaneous prevailing terminology, 257 with perforating inflammation of the appendix proven by autopsy and 209 of " typhlitis," and the like, with only a clinical diagnosis. This material he gathered in part from a comprehensive study of the literature (he cites 58 references in his paper) and in part from his own personal experience. Most of the cases reported in the *Boston Medical and Surgical Journal* during the period between 1871 and 1866 had come under his observation at the autopsy table; frequently he had seen them also before death.

His first report of such a case is in the fourth volume of the *Medical Autopsies of the Massachusetts General Hospital* (1871). The whole volume is in his own handwriting, neat, concise, methodical and complete, with marginal diagnostic headings. This is the case of a young man who entered the hospital October 16, 1871, ill 19 days with epigastric pain of sudden onset with vomiting, diarrhea, chills, fever and prostration; he died a month later. The autopsy revealed besides the lesions in the heart, lungs, kidneys, spleen, liver and portal system, also peritonitis and " tuphlo-enteritis " with perforation.

The vermiform appendix was adherent to the mesentery by recent adhesions unaccompanied by marked injection of the blood vessels. The appendage was bent at right angles, swollen. Just before the bend perforation had occurred and a minute circumscribed abscess was some two lines in diameter.

All subsequent volumes of medical and surgical autopsies at the Hospital up through 1886 show that Fitz was searching diligently for data on the appendix in all cases that came to his attention. In the earlier years, in the 'seventies, he still employed the old terminology, but it is evident that in his discussions and reports he soon began to stress more and more directly the role of the appendix in these cases. On April 18, 1881, in giving a post-mortem report, he mentions it for the first time in his title

" Pylephlebitis Originating in Inflammation of the Appendix Ceci." In his close inner circle the term " appendicitis " came into vogue even before he read his paper in Washington. Actually William Gannett, then his assistant, reported a case in April 1886 entitled " Vermiform Appendicitis and General Peritonitis Complicating the Puerpural Period."

In his study of the literature Fitz had been impressed by the writings of the English physicians Copland (1834) and Burne (1837) who stressed the role of the appendix in the origin of right iliac abscess. In 1880 two other contributions on the subject influenced him particularly. The first one was by Matterstock, a German, who on the basis of a large number of cases gathered from the literature and from hospital records, helped to clarify the nature of the disease.

> We have recently begun [he said] to emancipate ourselves from the idea which had hitherto dominated us, that the cecum was chiefly concerned in the causation of diseases in the right side of the abdomen. We are now constantly obtaining a better knowledge of the nature of the disease in the vermiform appendix, and the more our attention is focused on the morbid processes affecting this tiny organ, hitherto overlooked, the more frequently do we find it to be the chief if not the only cause of the rapidly fatal illness which we call perityphlitis.

The second one by With, a Norwegian, was even more definite as to the role of the appendix. In his analysis of 300 post-mortem records he found the appendix was diseased in varying degrees in 110 cases. He had also seen several cases of iliac abscess followed by general peritonitis with autopsy findings of ulceration of the appendix and became convinced that the great variety of right iliac affections known under protean names are in reality but inflammation of the appendix which he called " appendicular peritonitis."

Fitz commenting on it in his paper of 1886 says,

> With, influenced by the predominant importance of the independent consideration of inflammation of the appendix and its results, uses the term appendicular peritonitis to indicate the perityphlitis proceeding from the disease of the appendix. As a circumscribed peritonitis is simply one event, although the most important, in the history of the appendix, it seems preferable to use the term *appendicitis* to express the primary condition.

In a personal letter to Howard A. Kelly he speaks of the introduction of this term as follows:

> The word was coined by me purely for practical purposes. I wished to call attention to inflammation of the vermiform appendix as the primary lesion and that to which treatment was directly to be applied. Although etymologically incorrect the term was not without analogy. At the time my paper was written I wished to

discourage the prevailing view that the disease in question involved the cecum to any considerable extent. The subject is now so well understood that its nomenclature seems of minor importance. I much prefer appendicitis to Fitz's disease.

After giving an historical survey of the evolution of appendicitis as a clinical entity, unaware that his very own contribution would put it through its final crystallization, Fitz goes on to discuss systematically the various aspects of the disease, always comparing the data in his two series, always stressing the appendix, as against the cecum, as the origin of the disease. " The pathologist looks for the seat and cause of the disease and finds that in most fatal cases of typhlitis the cecum is intact, while the appendix is ulcerated and perforated."

His analysis led him to believe that perforating appendicitis occurs most frequently among healthy youths. In more than three-fifths of his cases there was found in the appendix inspissated feces, or a foreign body, favored by constipation and by congenital or acquired irregularities in the position or attachment of the appendix. Recurrence of attacks was noted in 11 percent of the cases of both series.

The inflammatory process once excited, its course shows extreme variation. Simple catarrhal appendicitis, though rarely recognized clinically, can nevertheless progress toward ulceration, even to peritonitis and other complications which may terminate fatally. Inflammation may result in partial or complete obliteration of the canal of the appendix. Inflammation of the peritoneal coat will produce serous and cellular exudation which enclosed between adherent coils of intestine and the abdominal wall forms a tumor. This circumscribed peritonitis is the " appendicular peritonitis " of With. The abscess may become absorbed; it may rupture into a hollow organ as the intestine, or through the abdominal wall to form a sinus; it may spread to remote parts, as to the liver or portal veins and through the diaphragm to the pleura and pericardium; or its contents may escape into the general peritoneal cavity. Death may follow any of the complications, at times even hemorrhage or the shock of the acute perforation.

Fitz then takes up the symptomatology of appendicitis, mobilizing his data with rare skill into a well-defined clinical picture. Again he stresses that inflammation of the appendix may occur frequently without giving rise to any characteristic symptoms, as brought out by his comparison of the results of post-mortem findings with clinical data recorded in the past histories of these cases and by the finding of evidence of disease of the appendix in more than one out of every three autopsies. The extent of these lesions suggests the probability that slight disturbances of digestion

are overlooked. There can be little doubt that a diagnosis of biliousness, gastro-enteritis, gravel and the like, may not infrequently conceal the existence of an inflamed appendix. The latency and the indefiniteness of the symptoms in certain cases of appendicitis are such that the eventual diagnosis is obscured, and the desirable method of treatment hopelessly postponed.

Sudden severe abdominal pain is the most constant symptom of perforating inflammation of the appendix. It occurred in 126 out of the 257 cases, 84 percent. It may be accompanied by nausea and vomiting. Though usually limited to the iliac fossa it sometimes extends upward to the liver or downward to the rectum.

Fever is the next constant symptom. The temperature is rarely high. If it is high a complication may be expected, such as liver abscess.

The tumor when present is of the utmost value in diagnosis. Its usual site is in the right iliac fossa, " below a line extending from the anterior superior spine of the ilium to the navel, nearer the former, and two fingers breadth above Poupart's ligament." It may be found in the pelvis or behind the cecum. There is localized resistance and muscle spasm. " A rectal examination not infrequently permits the recognition of the tumor which abdominal palpation fails to disclose."

Errors in diagnosis of appendicitis are numerous. An appreciation of the past history, the seat and character of the pain and the time when fever appears is necessary for the differential diagnosis.

In the majority of cases the resulting general peritonitis begins on the second, third and fourth days after inflammation of the appendix is established, with speedy death following almost invariably, 68 percent, within the first week. If surgical interference is not instituted within the first twenty-four hours after the onset of the sudden and intense right iliac pain " to keep the bowels quiet should be the first and last thought " while awaiting the localization of the peritonitis. A cathartic or an enema may excite general peritonitis. If the peritonitis appears to be spreading immediate operation is indicated.

Finally Fitz stresses the following conclusions:

The vital importance of the early recognition of perforating appendicitis is unmistakable.

Its eventual treatment by laparotomy is generally indispensable.

Urgent symptoms demand immediate exposure of the perforated appendix, after recovery from the shock, and its treatment according to surgical principles.

If delay seems warranted, the resulting abscess, as a rule intraperitoneal, should be incised as soon as it becomes evident; this is usually on the third day after the appearance of the first characteristic symptom of the disease.

Thus Fitz had demonstrated clearly and logically and convincingly the exact relation of inflammation of the appendix to right iliac abscess and peritonitis, establishing a definitive diagnostic picture of the disease, and laying down incisively the mode of treatment. For his immediate audience he had some of the outstanding physicians of the day, among them Weir Mitchell, Trudeau, Delafield, Jacobi. The paper was discussed by Pepper, Dana, Janeway and Loomis. The latter said, " This is a positive paper and it gives us some positive data on which to base our modes of action in this condition." Osler was there, and speaking of it reminiscently 29 years later he appraised Fitz's paper as " of the first rank making memorable that inaugural meeting of the Association of American Physicians as the coming-of-age party of clinical medicine in America."

The message of the paper reached the general profession through those present at the meeting, through its publication in the *Transactions of the Association of American Physicians* and in the *American Journal of Medical Sciences* and through an abstract of it by Fitz himself in the *Boston Medical and Surgical Journal.* The response was immediate. It was as if the facts of this common, frequently fatal disease, slowly accumulated through the ages but still unorganized and confusing, were crystallized by his catalytic energy into a clinical entity, easily discernible by all. To quote William S. Thayer:

> The publication came at a time when the world was well prepared. Everyone recognized that Fitz had, as it were, put his finger on the spot. Once set forth, the pathological and clinical sequence of events seemed almost obvious—obvious as are so many great truths when once they have been clearly enunciated. The sharp light thrown by Fitz on this common and perilous pathological event brought it about that our countrymen were fully ten years in advance of the rest of the world in their comprehension of this process and in their skill and efficiency in the care of the patient.

Immediately the attention of the profession became focused on appendicitis. Increasing numbers of case reports and studies on the various aspects of appendicitis and its treatment appeared in the journals. And after Fitz laid the path, other men, McBurney, Richardson, Worcester, Homans and Fowler, among others, developed additional diagnostic tests and perfected operative procedures. The change of attitude was well expressed by John Homans, Senior, when as consultant on a case he and the medical attendant, Dr. Greene, decided " not to wait for the autopsy but to operate at once."

In 1888 Fitz had to reiterate that

> it is the duty of every physician to be mindful that, for all practical purposes,

typhlitis, perityphlitis, perityphlitic tumor and abscess mean inflammation of the vermiform appendix; that the chief danger of this affection is perforation; that the perforation in the great majority of cases produces a circumscribed suppurative peritonitis, tending to become generalized; that in the light of our present knowledge the surgical treatment of this lesion offers the best chances for the life and future health of the patient and that the progress of the disease needs to be watched with knife in hand.

The anecdote has come down that soon after this was published he met Samuel Mixter and asked him what he thought of the article. " Very good, only when you say the surgeon should watch the patient with scalpel in hand, I say with the appendix in hand."

There was no lack of adverse repercussion. To advocate early surgery as Fitz did was " in the eyes of the conservative multitude rank heresy," so William W. Keen put it. For some time there were men, not many it is true, who still insisted that all cases of iliac abscess were not necessarily appendicitis and continued the use of the old diverting terms of typhlitis and perityphlitis. They were refuted completely, however, by Fitz in the journals and in his addresses before medical societies in different cities.

A case in point was the report by Walter Ella of Cambridge in the *Boston Medical and Surgical Journal* of February 6, 1890 of the successful surgical treatment of a boy of seven ill with typhlo-enteritis in whom he considered the iliac abscess due not to appendicitis but rather to an ulceration in the cecum. The appendix was regarded as healthy, as determined by a " careful digital examination although it was adherent to the abdominal parietes in the right loin and deemed not advisable to be detached." Fritz's letter in rebuttal was published in the next issue, giving Ella full credit for his successful treatment of the case but insisting on the practical importance of the correct appreciation of the pathology of abscess in right iliac fossa.

To one familiar with the results of such examinations made during life and controlled by the dissection of the appendix after death the negative evidence in Dr. Ella's case is insufficient to warrant the conclusion that appendix was healthy. On the contrary the fact of adherence and especially the presence in the cavity of a " fecal mass of the size of an ordinary dried white bean " would very directly point to the probability of an appendicitis with perforation. Such masses are usually moulded in the appendix and if found as part of the contents of a neighboring abscess are much more likely to have passed through the wall of the former than to have made their way out of the appendix into the cecum and through an ulceration of the latter.

The ulcer of the cecum in this case is more likely to have been the result than the cause of the iliac abscess. The breaking of the abscess into the cecum in the course of cases of appendicitis is so frequent and the rarity of an acute perforating

ulcer of the cecum from within is so extreme as to make it almost certain that with the existence of iliac abscess and perforation of the cecum appendicitis will be found as the cause of both.

In 1890 he analyzed 72 additional cases seen by him since 1886 and once more with the same dictum: "Every case of so-called perityphlitic abscess must be regarded primarily as one of perforating appendicitis unless proven to the contrary." In his paper of 1886 he urged that if any good results were to be obtained from surgery it must be applied early. He was even more radical in 1890, proposing "interval operation." The concluding paragraph is noteworthy.

It is evidently desirable to make the rules for the surgical treatment of appendicitis as simple as possible and I would advise it for urgent symptoms (rising pulse and temperature, increasing distention and spreading pain) with or without tumor; and for tumor with or without urgent symptoms. Recurrent attacks should be treated as first attacks. If recurrence is so frequent as to debar the patient from enjoyment of life or the ability to earn a living, removal of the appendix between attacks should be advocated.

A hundred years ago nearly every person stricken with this disease died. In 1856 Lewis of New York reviewed the literature of right iliac abscess consequent to a foreign body in the appendix—forty-six such cases with but one recovery. Fatal cases today, whatever the extenuating circumstances, are the result *only* of delay in surgical operation.

Dr. Fitz died September 30, 1913, at the age of 70. On the eve of the 17th of November 1913 a memorial meeting was held at the Harvard Medical School. Addresses were made by William W. Keen, Charles W. Eliot, Henry P. Walcott, William S. Thayer and William T. Councilman. In his introductory remarks Dean Edward H. Bradford made the following significant statement. "The occasion is unusual. A great university, a living institution of learning rarely pauses long to note the passing of those who have enjoyed the privilege of its authority. But the service noted tonight is remarkable. Many have sought truth, but it is rare to have found and taught it so clearly that the lives of thousands and thousands were saved thereby."

WILLIAM OSLER'S PHILOSOPHY

LUDWIG EDELSTEIN

In many of the addresses which Osler delivered in the course of his academic career, he touched upon general problems that lie beyond the pale of medicine. In some of these lectures he even was entirely, or primarily, concerned with nonmedical matters, questions of conduct and knowledge.[1] To be sure, he did not approach such topics in a systematic way. His utterances always retained the color of the impromptu and apropos. Nevertheless one has the feeling that his remarks were determined by a definite view of life, by a certain philosophy that binds them together.

It is true, Osler's own statements on this subject seem to contradict such an impression. At the end of his life he asserted: "I have never succeeded in mastering philosophy—cheerfulness was always breaking in."[2] At the height of his career he had stated that he was "neither a philosopher nor the son of a philosopher," and, if in the same breath he confessed to having a "philosophy of life" which he called "as frankly pragmatic as that of the shepherd in *As You Like It*," he was satisfied with defining it in the terms used by this Shakespearean character: "I am a true labourer; I earn that I eat, get that I wear, owe no man hate, envy no man's happiness, glad of other men's good, content with my harm, and the greatest of my pride (to paraphrase Corin's words) is to see my patients get well, and my students work."[3] This definition of his attitude toward life is hardly one that could stand the test of philosophical scrutiny, and in its lack of technical phraseology and flavor it gives support to those who deny that Osler can be credited with any interest in philosophy proper. Thus Cushing tends to contrast Osler "practising his own philosophy and largely unconscious of self" with the "philosopher-in-precept," and Major

[1] I am referring to the essays published by Osler himself in 1904 under the title *Aequanimitas* (in the following I quote from the 8th impression [1928] of the second edition of 1906); and to *Science and Immortality* (1904), *The Student Life* (1905), *Man's Redemption of Man* (1910), *A Way of Life* (1913), published under the title, *The Student Life and Other Essays*, by Sir William Osler, ed. by H. H. Bashford (Constable's Miscellany), 1928; and finally, *The Old Humanities and the New Science*, 1920.

[2] *Old Humanities*, 54 f.

[3] *Student Life*, 105 and note 2 (the reference is to Act III, Scene II, 72-76; the dialogue here turns on the difference between courtly life and that of the shepherd, the representative of the natural life); cf. also *ibid.*, 76 and below pp. 286 f.

Greenwood maintains that Osler had no use even "for philosophies in medicine; at least for any philosophies but his own. That was quite simple. One observed and experimented." [4] I readily grant that Osler never put on the robe of the professional philosopher, that he always was and remained a physician. Yet one who does not master philosophy may still be a student of it and may have pondered carefully the implications of his views, the reasons that can be advanced for or against them. At any rate, it is permissible to ask whether his opinions are consistent and how they are related to the main systems of thought current in his time. By considering these questions as regards Osler, and by analyzing his opinions in more detail, one should at least achieve a clearer appreciation of his thought.

I.

The earliest document that fully delineates Osler's views is the first essay in the collection of his papers which he himself published in 1904. The address dates from 1889. Osler was then a mature man with settled opinions. His position at that time will become more understandable, I think, if one tries first to ferret out how his ideas developed and what influences shaped his mind in the formative years of his life.

The son of a clergyman and himself bent on studying theology, Osler grew up in an intensely religious atmosphere. The books with which he was most familiar in his early youth undoubtedly were the Bible and the writings dealing with divine subjects which predominated in his father's library. On the other hand, he also found there the works of his uncle Osler, the naturalist doctor, and he studied them too. Even late in life he recalled the "amazing veneration" which he cherished for his relative.[1] In the same way, during his boarding-school days, natural investigations went hand in hand with theological reading and instruction. Osler, while a boy of 15 or 16, still was notably proficient "in that greatest of books, the Bible." [2] But Father Johnson, his beloved teacher, was as much a naturalist as he was a theologian; he "followed the seasons of Nature no less ardently than those of the Church." To him, as to so many of his generation and training, God's greatness revealed itself in His creation, no less

[4] H. Cushing, *The Life of Sir William Osler*, II, 1925, 120; Major Greenwood, *The Medical Dictator*, 1936, 162. E. G. Reid, *The Great Physician*, 1931, does not seem to pay any attention to Osler's philosophy, nor do those many short appreciations of Osler published after his death, of which I perused a fair number. O. Clark, *Sir William Osler e sua philosophia* (1842-1919) in *Brasil Medico*, 35, 1921, 338-340, in spite of the title, is but a biographical account.

[1] Cushing, I, 16.

[2] *Ibid.*, 25.

than in His scripture. Osler thus was encouraged to acquire thorough knowledge of natural phenomena, and it was mainly Lyell and Dana who interpreted the world of nature for both teacher and pupil.[3]

After Osler had entered college, and after he had decided to study medicine, natural studies, of course, predominated; and though the broader issues were not lost sight of, merely religious schooling or controversy apparently became less attractive to him. To the Reverend Professor Bevan who was entrusted with the privilege of "directing the minds of the thinking youths at the Provincial University into proper philosophical channels . . . the hungry sheep looked up and were not fed." Like certain others, Osler preferred to reason with Bovell, the Professor of Natural Theology and Lecturer in Medicine, on "Providence, Foreknowledge, Will and Fate, Fixed Fate, Freewill, Foreknowledge absolute."[4] In these debates the theological and scientific arguments attracted him. Of philosophy the student learned little from his teacher. Bovell did not succeed in making him read Locke or Berkeley, Kant or Hegel, Spinoza or Descartes, or any of the moderns. He was only able to kindle through his lectures some interest in Cousin, Jouffroy and others of the French school.[5]

While Osler was in college, Darwin's theories were in the ascendancy. *The Origin of Species* had appeared ten years after he was born; the *Origin of Man* came out in the year of his graduation. Bovell, caught in the storm "which shook the scientific world with the publication of the *Origin of Species*," had "sought a harbour of refuge in writing a work on Natural Theology;" he was one of the "really devout students." In his house Osler heard long debates in which the attempt was made "to reconcile Genesis and Geology."[6] There is no evidence that Osler became an adherent of the new gospel. He does not seem to have made a decision either way. Once, when his thoughts were engrossed with his examinations and with his future, he picked up a volume of Carlyle and found on the page he opened the familiar sentence: "Our main business is not to see what lies dimly at a distance, but to do what lies clearly at hand."[7] This "common place sentiment" took hold of his imagination. It started him, as he says

[3] *Ibid.*, 34 ff.; especially 37. For Johnson, cf. *An Alabama Student* etc., 1908, 248.
[4] Cushing, I, 69.
[5] *Ibid.*, 62 f. [6] *Ibid.*, 68, 62.
[7] *Student Life*, 80; cf. Cushing, I, 81; II, 354. The quotation is from the beginning of Carlyle's essay "Signs of the Times" and reads somewhat differently: "Our grand business undoubtedly is, not to *see* what lies dimly at a distance, but to *do* what lies clearly at hand."

in 1910, on his lifelong habit of utilizing to the full the talent entrusted to him. At the moment when he read the words, they may have meant more to him. For although in his dissertation he politely bowed before the wisdom of the theologians,[8] he was perhaps already impregnated with scepticism. From his boyhood he had been impressed by Thomas Browne's *Religio Medici*, which, as he noted late in life, combined daring scepticism with humble faith in the Christian religion: the author has run through all systems but has found no rest in any. The saying of Carlyle likewise may have been taken by him as an admonition to renounce far-reaching religious or philosophical speculations.[9]

However that may be, the break with the past came with Osler's visit to London in the year 1872 immediately after he had received his degree. London University, in the eighties of the last century, was an "infidel foundation" where "infidel ideas" were preached, Johnson complained in 1876, "a dangerous school. . . . Unquestionably W. Osler shews it was so to him." Johnson leaves no doubt as to the provenience of those infidel ideas with which one was indoctrinated at London: they were those of "Darwin, Huxley and Co." [10] Osler in fact did become a follower of Huxley, an agnostic. As early as 1882 it must have been common knowledge that he had turned apostate. For, as an anecdote has it, the father of a young lady whom he courted objected to a son-in-law with agnostic leanings and no visible means of support.[11]

It is difficult to ascertain the steps by which Osler worked out his new philosophy or to describe exactly the extent to which he accepted the new dogma. His public utterances made before 1889 rarely deal with general problems. The Valedictory Address of 1875 is mainly concerned with medical education; Thomas Browne's *Religio Medici* is referred to but casually. In the Introductory Lecture of 1877, Carlyle is quoted. and the speaker bids the students to "banish the future and live for the hour." [12] The teacher Osler, then, seems to have been preoccupied with his own

[8] Cushing, I, 85. Note the words: "In that Trinity of being—of body mind and soul . . . each one has its own special ills and diseases . . . those of the third class [sc. of the soul] beyond a Physician's skill seek aid elsewhere."

[9] Even if Osler did not read on, the title of the essay would have directed his thought to more general considerations. The essay itself embodies Carlyle's gospel of work and glorifies action as contrasted with speculation. For Carlyle, cf. also below p. 287. For Thomas Browne and Osler's relation to him, cf. Cushing, I, 50, 73; *Alabama Student*, 248, 273, 275.

[10] Cushing, I, 147 f.

[11] *Ibid.*, I, 201. Osler started reading Huxley in high school; *ibid.*, 34.

[12] *Ibid.*, I, 129, 157.

field and with moral problems. His letters, however, allow at least a glance at his continuing interest in the relationship between theology and the doctrine of evolution. He reads Mivart's *Lessons from Nature*, a book which Johnson considered a refutation of Darwin and Huxley,—probably siding with Huxley who severely criticized the work and pointed out its errors.[13] Moreover, close attention is paid to the discussion of Darwin's theories by the great scientists of the day. When again in Europe, Osler writes approvingly about Virchow's defence of Darwin against Haeckel.[14] Later, in Philadelphia, as a member of the Biological Club, patterned after Huxley's famous X Club, Osler must have found ample opportunity himself to discourse on the implications of agnosticism and to listen to the discourses of others, among them Leidy who, as Cushing puts it, was " Osler's chief delight at these meetings." [15]

On the other hand, resolute and courageous as the acceptance of the infidel philosophy was, the process by which it was brought about was a painful one. Osler himself has given eloquent testimony to the hard struggle that beset his generation which, educated in the tenets of Christianity, was confronted with the discoveries of Darwin— and, as he later added, with the results of a critical study of the biblical texts—that destroyed the belief in Divine Revelation. With the passion and knowledge of one who participated in the fight he has described the suffering of those who lived " from the days when faith was diversified with doubt, to the present days, when doubt is diversified with faith." [16] Moreover, Osler's own attitude toward Christianity never was quite in conformity with his new creed. Shortly after his return from London where, according to Johnson, he had imbibed his infidel ideals, he performed the last offices of Christian friendship, " as the son of a clergyman," and read the Commendatory Prayer at the deathbed of a young man who was a chance acquaintance.[17] He certainly felt impelled by his newly gained insight to give up many articles of the faith. Nevertheless he remained a Christian, not only in name, but also in his heart. Throughout his whole development he may have believed what he states as his considered opinion in 1894: " The shackles of dogma have been removed, and faith herself, freed from a morganatic alliance, finds in the release great gain." [18] Again, from the beginning,

[13] Cushing, I, 147-9.

[14] *Ibid.*, I, 214.

[15] Cushing, I, 243 f.

[16] *Student Life*, 121; cf. 119, also 58; *Old Humanities*, 6 ff. In *Aequanimitas*, Darwin's contributions alone are mentioned, e. g. 94 f.

[17] Cushing, I, 136.

[18] *Aequanimitas*, 100; for the criticism of Christianity, cf. below p. 288.

Osler held certain reservations in regard to Huxley's doctrine of the freedom of will. In 1882 he undertakes investigations of the brain and tries to decide whether the thinking organ is an "automaton." Contrary to a claim recently made, the existence of "criminal automata" is denied; it is stressed that even Huxley, the proponent of the automaton theory, demands punishment of the criminal regardless of the question of responsibility, and Osler obviously is one of those who, like the majority of people, for a long time to come will believe in freedom of will though they are inconsistent in doing so.[19] Finally, this follower of Darwin and Huxley was never satisfied with biological doctrines and natural studies. Even in these early years the reading of literature was to him indispensable. He took up Holmes and Newman and John Brown's *Horae Subsecivae*; he delved into Plato and Shakespeare, Shelley and Keats.[20] He was apparently searching for another, a higher inspiration.

II.

To turn now to Osler's mature thoughts, as they are embodied in those essays which he himself thought worth reprinting and making available to the public at large—the first, giving to the whole collection its name, unambiguously avows his adherence to the agnosticism of Huxley and his circle. Having advocated imperturbability of body and equanimity of mind as the essential conditions for a proper fulfillment of the physician's task, he admits that knowledge of the Absolute is unattainable: "Uncertainty . . . pertains not alone to our science and art, but to the very hopes and fears which make us men." [1] Five years later, in 1894, he glorifies Leidy as the great example of the scientist. He was not a sceptic as far as the facts of science are concerned, but he was one as regards "the ultrarational," a scepticism that was indicative of "an influence of science which has attracted much attention and aroused discussion." [2] The last words of this statement betray the unpopularity that still attached to the philosophy accepted by Leidy and his admirer.

With the epistemological implications and difficulties of agnosticism, Osler, it seems, is nowhere concerned. Rather does he concentrate on the consequences that have issued from the theory of evolution conceived

[19] "On the Brains of Criminals," *Canada Medical and Surgical Journal*, 1882, 15 f: Shakespeare's Iago is quoted as best expressing the "inconsistent" view. Cf. also Cushing, I, 187, 195 f. (also 207, 291 f.); and below p. 281. For Huxley, cf. *Aphorisms and Reflections*, ed. by H. A. Huxley, 1908, CCLVII-VIII, CCVII.

[20] Cushing, I, 210, 225, 204 f. (cf. 513), 265. Cf. also below pp. 278 f.

[1] *Aequanimitas*, 7. [2] *Ibid.*, 87.

by Darwin. For this theory "has revolutionized every department of human thought," and "in no way has biological science so widened the thoughts of men as in its application to social problems." [3] When in 1894 Osler discusses the social question, he puts the problem as it has been formulated by Benjamin Kidd in his book on *Social Evolution*, a treatise which appeared in the same year and immediately made a great stir in America and England. One must ask, he holds, whether the struggle for existence is to continue indefinitely or whether the dreams of the millennium are capable of realization. In different terms, one must ask whether acquired qualities can be transmitted from one generation to the other by inheritance, whether Lamarck or Weissman is right. Depending on the answer to these questions, science will have to understand "all the phenomena of human life, individual, political, social, and religious," one way or the other.[4] Osler does not commit himself in the scientific terminology which he himself has used, but his position is unmistakable. Science, "the last gift of the gods," has no message of hope for the human race as a whole. Law, order, the *civitas Dei* in the *regnum hominis* will never come. Science "has done much, and will do more, to alleviate the unhappy condition in which so many millions of our fellow-creatures live," especially by mitigating diseases. It contributes to the education of the individual, strengthens "the sinews of the understanding," and, "working in the individual, leavens in some slight degree the whole social fabric. Reason is at least free, or nearly so." But salvation is beyond the reach of man. "No leaven, earthly or divine, has worked any permanent change in him. . . . Who runs may read the scroll which reason has placed as a warning over the human menageries: 'chained, not tamed.'" For the passions of man, the irresistible forces of the human heart, never change.[5]

Osler, then, does not believe in the gospel of a natural evolution of society and morals. Like Kidd, to whose book he gives such a prominent place in his discussion of the problems involved, he is in opposition to Spencer. With this philosopher it was axiomatic that conditions and men will, and do change for the better in course of time, though he foresaw a decline of the good once the optimum had been reached. Nor does Osler agree with Spencer's American apostle, Fiske, for whom ethical progress is rooted in biological evolution itself. A certain courage was needed in the

[3] *Ibid.*, 94 f.

[4] *Ibid.*, 95-97. For Kidd and his book, cf. R. Hofstadter, *Social Darwinism in American Thought*, 1944, 80 ff.

[5] The quotations are taken from *Aequanimitas*, 98-100; the sequence of the sentences is slightly changed.

America of 1894 to reject the Spencerian belief in progress. It had pervaded the country almost to the exclusion of any other gospel; it was upheld even by the law courts as if it expressed the laws of nature. Even in 1905 Justice Holmes, in one of his famous dissenting opinions, could expostulate: "The Fourteenth Amendment does not enact Mr. Herbert Spencer's *Social Statics*." [6]

I do not mean to imply that Osler denied moral progress altogether. Two years before he gave his verdict against the theory of natural evolution, in 1892, he had said: "The ideal State, the ideal Life, the ideal Church—what they are and how best to realize them—such dreams continue to haunt the minds of men, and who can doubt that their contemplation greatly assists the upward progress of our race?" [7] For throughout history the things that are great have been accomplished by those who were inspired by ideals. "Moving in a world not realized," men sought to express their conceptions in deeds, and these deeds are wondrous because they are "but the outward and visible signs of the ideals which animated them." [8] Osler, then, does acknowledge a certain evolution of ethics, in spite of his pessimism as to its final results; and this progress, he maintains, as far as it can be brought about at all, depends on human ideals, on human thought.

In taking such a stand, Osler deviates from the position taken by Kidd. For Kidd invoked religion and altruism as helpers in the fight for improvement, the one being that power in man which is in conflict with his own reason, the other that which is super-rational.[9] It is more important to note that Osler, the adherent of Huxley's agnosticism, disagrees with the master in his interpretation of moral and social phenomena. Even in his Romanes Lectures of 1894, Huxley appeals to law and morals as restraints upon the struggle for existence between men in society; betterment, he upholds, is achieved by "a constant struggle to maintain and improve, in opposition to the State of Nature, the State of Art of an organized polity." Otherwise, "the best," who are by no means identical with the "fittest," cannot survive. Natural affection and sympathy, an

[6] S. E. Morison and H. St. Commager, *The Growth of the American Republic*, 1934, 713. For Spencer, e. g. Hofstadter, 18 ff.; for Fiske, *ibid.*, 151 ff. Osler owned a copy of Spencer's *Social Statics* (*Bibliotheca Osleriana*, 1929, no. 1612).

[7] *Aequanimitas*, 42; for the limitations of progress cf. below p. 289.

[8] *Ibid.*, 41 f. Osler exemplifies his view by reference to the works of artists. I have transposed the arguments to human accomplishments in general, since it is clear from the context that the words were meant to be thus understood.

[9] For Kidd, cf. Hofstadter, 81.

innate sense of moral beauty and ugliness, are the only safeguards of ethics.[10] Huxley continues to think in biological and universal terms. Osler argues in spiritual categories and from the point of view of the individual.

The physician, his agnosticism notwithstanding, obviously clings to a theory of the nature of man that is radically different from that of the scientist. For Huxley, consciousness is but a collateral product of the mechanism of the body, completely without any power of modifying the working of its machinery. The passions must and can be trained to cooperate in harmony with the laws of Nature, comprehended by the intellect.[11] Osler, long before 1894, had rejected the automaton doctrine of Huxley and avowed his belief in the freedom of will, however inconsistent such a belief may be with other data.[12] He considers head and heart, intellect and passions, the two great antagonists in man. On the one side, there is the intellect which in scientific endeavor analyzes facts, or in theoretical contemplation devises ever-changing ideals. On the other side, there are the human passions, unalterable throughout the history of mankind and never to be justified or controlled by science. Moreover, both head and heart are productive of action. The passions furnish the more important motives, for it is "the human heart by which we live," but we are also driven on by our dreams, our ideals.[13] In consequence of such a divergence, Huxley and Osler are at variance also in their concepts of education and culture. While for Huxley liberal education is provided by science, and while for him the judgment of truth is derived from scientific research rather than from books,[14] Osler consistently maintains the value of literary studies. As early as 1894 he praises Leidy who did not experience "'the curious and lamentable loss of the higher aesthetic taste' which Darwin mourned."[15] A speech given in 1903 elaborates on this assertion. Man needs a higher education which his daily work, his scientific training do not give him. It is, moreover, "no longer intrinsic, wrought in us and ingrained," it can be achieved only through individual effort. "Personal contact with men of high purpose and character will help a man to make

[10] For Huxley, cf. Hofstadter, 77 f.; *Encyclopaedia Britannica*, 11th ed., s. v., 20b.

[11] T. H. Huxley, *Science and Education*, 1894, 83, 86; cf. below n. 17.

[12] Cf. above p. 275.

[13] *Aequanimitas*, 4 f., 99.

[14] Cf. in general "A Liberal Education," [1868], in *Science and Education*, 76 ff.; and also the Inaugural Address delivered in 1876 at the Johns Hopkins University, *American Addresses*, 1886, 99 ff. The belles lettres are considered only "the greatest of all sources of refined pleasure"; *Science and Education*, 109.

[15] *Aequanimitas*, 88.

a start—to have the desire, at least, but in its fulness this culture—for that word best expresses it—has to be wrought out by each one for himself." And it is through books that the aim is attained. One should read Job and David, Isaiah and St. Paul, Shakespeare, Epictetus and Marcus Aurelius, Plato, Montaigne and many other "literary heroes." Thus, and thus alone can one hope to acquire "wisdom in life." [16]

If Osler's assumptions concerning the nature of man, his possibilities and aims, may be related at all to any of the philosophical or psychological doctrines of Osler's time, then it is, as far as I can judge, the doctrine of his great contemporary William James to which one must make reference. In his *Psychology*, James has refuted Huxley's automaton theory as he has also opposed the view of Clifford for whom the mind is an epiphenomenon of the body. Instead, he has tried to show that the brain, the instrument of possibilities, is endowed with causal efficacy, that it is a conscious fighter for ends. Judgments of the "should-be" he holds to be as real as judgments of fact.[17] Moreover, James has proved against the natural view, as he calls it, that in emotions, in the coarser ones no less than in the more subtle ones, it is the sounding board of the body that is at work. Bodily changes, not mental perceptions, are the cause of passions. Head and heart are then two powers, independent of each other, yet of equal importance for man's actions.[18] Finally, James is convinced of the immutability of the human heart. The progress of society, in his opinion, is limited by this very fact, although he admits that improvement of evil conditions is bound to be achieved.[19] And he pleads that man should not dig the grave of his "higher possibilities" by neglecting poetry, spiritual reading, meditation, music, pictures or philosophy. In confirmation of the necessity of reading, he quotes a passage from Darwin's autobiography—a passage "which has often been quoted"—in which Darwin suggests that "the loss of these tastes is a loss of happiness, and may possibly be injurious to the intellect, and more probably to the moral character, by enfeebling the emotional part of our nature."[20]

[16] *Ibid.*, 383-5, and note on 475; cf. also *Alabama Student*, 276 f.

[17] W. James, *The Principles of Psychology*, I, 1896 [1890], 129 ff.; for Huxley and Clifford, *ibid.*, 131 f. Cf. also *Collected Essays and Reviews*, 1920, 66 f. [1878].

[18] *Ibid.*, II, 449 ff.; especially 470-472; also 578.

[19] Cf. below p. 289.

[20] *Talks to Teachers on Psychology*, 1901 [1889], 71 f. That Osler knew this book is certain, cf. below p. 282. For the importance of emulation to which Osler refers, cf. *ibid.*, 49 ff., and *Psychology*, II, 579: "But just as our courage is so often a reflex of another's courage, so our faith is apt to be, as Max Müller somewhere says, a faith in someone else's faith. We draw new life from the heroic example."

From all that has been said, it seems to me, only one conclusion can be drawn. Osler, in the period between 1889 and 1904, although he was a follower of Huxley in so far as to him the Absolute is the Unknowable, in his outlook on man and on society was a Jamesian rather than a Huxlerian.

III

Before proceeding to Osler's later writings I must discuss a topic that has some bearing on the characteristic of his point of view given just now, and on the interpretation of his later addresses as well, namely, Osler's relationship to James. I have labelled the Osler of *Aequanimitas* a Jamesian. Was he familiar with James' work, or is the agreement with his ideas accidental? James' name does not seem to be mentioned in any of the papers written and published before 1904. It is only in this same year, in his Ingersoll Lecture, which is not included in the collection *Aequanimitas*, that Osler refers to James. He praises him as the man who has studied, in a singularly lucid way, one of the most important facts in man's history: the irreconcilable hostility which from the standpoint of science, representing the head, exists in regard to the emotional or cardiac side of life's problems.[1] That Osler was conscious of his agreement with James, then, is certain; he could hardly have spoken about him as he did, had his own essays, which were just coming out of the press, exhibited a contrary opinion. But the question arises whether in his earlier years Osler learned from James, or whether the tribute paid to him is merely the recognition of a spiritual kinship discovered later on.

The decision is not an easy one to make. Osler in 1892 gives the impression that his understanding of the value of ideals came to him in a moment of inspiration while he was admiring the beauty and splendor of a work of art. Moreover, in 1894 in his interpretation of human passions, he quotes Marion Crawford as "a student of the heart of man, a depictor of his emotions," as if he intended to make him his authority.[2] I cannot imagine that Osler seriously meant to imply that from this average novelist, renowned and acclaimed as he was in his day, he learned the nature of the human heart and its relationship to reason. Many another great poet whom he knew could have taught him the same lesson. I find it equally

[1] *Student Life*, 133 f.

[2] *Aequanimitas*, 41 f., 99. For Crawford, cf. V. L. Parrington, *Main Currents in American Thought*, III, 1930, 171 f., cf. 237; and *Dictionary of American Biography*, *s.v.* I have not thought it necessary to peruse the numerous writings of Crawford in order to identify the book and page to which Osler refers.

unconvincing that the scientist Osler, the pupil of Huxley, could be indebted to his own inspiration for an understanding of the working of the human intellect that differs so greatly from that of his master. Osler's anatomical investigations into the brain show clearly on what grounds he really based his dissent.[3]

But even if one feels one may safely disregard Osler's own comments on the sources of his philosophy, one must nevertheless admit that opinions such as those held by him in regard to man's nature may derive from many different systems or may simply summarize one's experience. In Osler's case, their similarity to those of James may be due to a similarity of the temperaments of the two men, or to some presuppositions which they had in common. Both Osler and James were deeply influenced by Carlyle's philosophy of work, both indulged in hero worship and believed that history was made by great men.[4] Granted all this, it remains unlikely that Osler, the insatiable reader who closely followed the contemporary scientific and philosophical debates, should not have been acquainted with James' *Psychology* published in 1890, and the many previous and later essays which had made him well known. One should also suppose that the studies of James, who was a scientist and was trained in medicine, must have had a special appeal for the scientist and physician Osler, and I for one cannot believe that they were not instrumental in shaping Osler's thought.[5]

However that may be, there remains the agreement with James which Osler himself notes, and there is, from 1904 on, friendship between the two men and, on the part of Osler, a continuous interest in James' philosophy which now developed into its final form of pragmatism. As for their personal relations, there is a possibility that Osler had met James as early as 1879.[6] At any rate, during the last years of James' life, he and Osler were rather close to each other. In 1908, Osler invites James to be

[3] Cf. above p. 275.

[4] For Osler's hero worship (as he called it himself), cf. Cushing, I, 266. For Carlyle, cf. above p. 272. Osler quoted the Carlyle passage for the first time in 1877 (Cushing, *ibid.*, 157); cf. also *Aequanimitas*, 110; 473. For James, cf. *Great Men and Their Environment* [1880] in *The Will to Believe*, 1897, 216 ff. For James' relation to Carlyle, cf. R. B. Perry, *The Thought and Character of William James*, 1936, especially I, 145 f., 159, 464 f.; II, 271, 274, 673 (I owe these references to the kindness of Professor A. O. Lovejoy).

[5] In the introduction to James' *Psychology*, it is stressed that he has "kept close to the point of view of natural science throughout the book" (I, V), and it is also pointed out that several chapters were published before (*ibid.*, VII).

[6] Cushing, I, 174; the reference is to the collection of W. James' letters where, however, Osler is not mentioned.

his guest while staying in Oxford to deliver the Hibbert Lectures. In 1910 James gives Osler a detailed account of his state of health and promises further reports, while Osler again comments on James' health in letters to other people.[7] Nor does it need a special occasion or contact to remind Osler of James. Congratulating a friend on his engagement, he jokingly expresses the wish that James would study "the mental state of man a few weeks after acceptance." When in Paris attending a lecture of Bergson, he hears the French philosopher praise James and finds this an important enough event to be relayed to Boston.[8]

How far Osler was acquainted with James' philosophy one can in part conclude from the books preserved in his library. He owned copies of *Pragmatism* and *Some Problems of Philosophy*, the speech on Agassiz, and in addition several monographs on James of which the article by Putnam is described in a letter as most interesting.[9] It would, however, be wrong to suppose that Osler knew no works other than those in his possession. The quotation from James in Osler's lecture of 1913 is taken from the *Talks to Students*, published in *Talks to Teachers on Psychology*.[10] Moreover, while on a short visit to America in 1906, Osler listened to James' "remarkable" lecture on the *Energies of Men*, the contents of which he vividly recalled in 1915.[11] Osler also attended James' lecture course on *A Pluralistic Universe*, in which one remark, as he said a year later, struck him particularly: "We live forward, we understand backwards."[12] There is, of course, no way of calculating how many more of James' essays or books Osler read without mentioning them or referring to them later. But even from the few data preserved the fact emerges that Osler was familiar with almost all the important writings belonging to James' pragmatic period and with some dating from earlier years.[13]

To be sure, there are many books which Osler read and quoted, there are many great people whom he knew and praised, but his interest in James seems outstanding. The epithets given to this philosopher have an

[7] For James' letters, cf. Appendix, below pp. 292 f. It appears that Osler gave medical advice also to James' daughter. For further comment on James' health, cf. Cushing, II, 218.

[8] Cushing, II, 183, 156.

[9] *Bibliotheca Osleriana*, no. 3074-3078, 6569; for Putnam, cf. Cushing, II, 258.

[10] Compare *Student Life*, 92 f., with *Talks to Teachers*, 214.

[11] Cushing, II, 491 (and W. James, *Memories and Studies*, 1911, 229 ff.).

[12] Compare Cushing, II, 177, with James, *A Pluralistic Universe*, 1909, 244. James quotes the words that so impressed Osler from a "Danish Writer" (Kierkegaard) when he is discussing the relation of the intellect to life. He must himself have been impressed by the quotation, for it occurs also in *Pragmatism*, 1907, 223 (chapter on Truth).

[13] As for James' later works, only his *Radical Empiricism* is not mentioned; for earlier books, cf. p. 279; for *The Will to Believe*, cf. below p. 285.

unusual ring, especially considering the circumstance that he was still alive when he was thus honored. In 1904 Osler called James " one recognised everywhere as a master in Israel." [14] He was speaking at Harvard, where most of James' work was done, and for a moment one might be inclined to take the commendation as a polite bow before Harvard's great son. But years afterwards, and this time at Yale, he again called James a " master in Israel." Still later, in his catholic taste for cultures and races, Osler referred to James as the " American Socrates." [15] Surely, an influence of James on Osler's thought as it is embodied in his later addresses is a factor which the interpreter is allowed, even obliged, to take seriously.

IV

The second group of Osler's speeches comprises those given between 1904 and 1919. Of them the lecture on *Science and Immortality* comes first chronologically, and it is perhaps also the most interesting paper on account of its subject matter and on account of the change in Osler's attitude which it betrays. For a long time Osler had hesitated to accept the invitation to deliver the Ingersoll Lecture. Did he feel that he was not yet prepared to discuss with assurance so vast an issue? When he at last consented to speak " before a Boston audience on such an impossible subject as Immortality, " he labored on the address perhaps more than on any other which he had ever given.[1]

As the title itself indicates, the lecture was to discuss the topic from the point of view of science. In the preface Osler reiterated his intention " to approach the problem from the standpoint of a man, part at least of whose training has been in the habit and faculty of observation, as Aristotle defines science." [2] The result arrived at is simple and expressed with clarity and forthrightness: " Knowing nothing of an immortality of the spirit, science has put on an immortality of the flesh;" the generating substance alone can be considered eternal.[3] In 1904 such a statement, regardless of its correctness or falsity, was not without broader implications. During the preceding years attempts had been made to prove the immortality of the soul scientifically. The investigations of F. W. H. Myers and of his Society for Psychical Research were much in vogue; they had received the friendly acclaim of James. Osler dismisses them with a shrug of the shoulders. He also refutes by implication James'

[14] *Student Life*, 133 f. and note.
[15] *Ibid.*, 92, and Cushing, II, 491.
[1] Cushing, I, 598, 638.
[2] *Student Life*, 105.
[3] *Ibid.*, 127-129.

endeavors to remove scientific objections to the assumption of immortality and the contentions of pragmatists like Schiller that the possibility of a scientific proof of the existence of the soul must be acknowledged.[4] Nay, he proceeds to show that, contrary to the claims recently made, from the point of view of science even the reality of the problem at stake must be questioned. A few years before Osler's talk, the American Branch of the Society for Psychical Research had issued a questionnaire that was meant " to determine the nature of men's actual sentiments and actual bias " in regard to death. Schiller had expressed his hope that this inquiry, even if the majority of people should prove to be indifferent in the matter, would stimulate interest in the problem and thus make it a real one; for to him even the possibility of knowledge depended on the " social atmosphere." The answers to the questionnaire were critically discussed by Schiller in 1904.[5] Osler, on the evidence of his own research which he had begun long ago, denies that men of his generation, even in the last hours of life, are still troubled by any concern with immortality. It thus appears that the scientist, unable as he is to give a positive solution of the problem, is also dealing with a sham question.[6]

President Eliot, so the story goes, had long wished that a physician should discuss the subject of immortality, and when he invited Welch to do so and the latter refused because " Science had nothing to say on the subject of immortality," Eliot answered that that was just what he wanted him to say. After Osler's speech, however, Eliot " expressed himself as greatly disappointed, for instead of hearing a scientific discourse on the subject, if there could be such a thing, he had listened merely to a brilliant and charming essay." [7] This reaction at first seems astonishing. For one

[4] Contrast *Student Life*, 126 f., with James, *Memories*, 145 ff. [1901], and *Human Immortality*, 1898, 24 f. (Ingersoll Lecture); cf. also F. C. S. Schiller, *Humanism*, 1903, 288 (the book was in Osler's possession [*Bibliotheca Osleriana*, no. 5422]; the editors rightly draw attention to the fact that the three last papers deal with immortality). Incidentally, the two references to Schiller in Cushing, II, 515, 559, concern the pragmatist Schiller; the index lists the references under F. von Schiller (p. 559 deals with Schiller's paper in *Studies in the History and Method of Science*, ed. by C. Singer, I, 1917, 235 ff; which of the medical papers of Schiller is referred to on p. 515, I cannot say).

[5] The questionnaire is reprinted in Schiller, *Humanism*, 243-245; cf. 228, n. 1. For Schiller's own views, *ibid.*, 245, 248 f. Osler possessed the collected answers (*Bibliotheca Osleriana*, no. 5423).

[6] *Student Life*, 117. For Osler's investigations, cf. also Cushing, I, 294, who stresses Osler's deep philosophical interest in the problem of death, and notes that a great number of his books concerned this question.

[7] Cushing, I, 597, 639. Eliot approved only that part of the speech in which Osler spoke of the last sensations of the dying (*ibid.*, I, 639).

would think that Osler had succeeded, and succeeded well, in doing what Welch had considered impossible: to fill an hour with saying that science has nothing to say upon the subject. The main reason for Eliot's disappointment is to be found, I think, in the fact that at the end of his address Osler suddenly turns about and pronounces judgment in favor of the belief in immortality. After wandering through all the phases of indifference, scepticism, and hope, he says, some people at last will come "to the opinion of Cicero, who had rather be mistaken with Plato than be in the right with those who deny altogether the life after death; and this is my own *confessio fidei*." [8]

Such an avowal of faith comes indeed as a disappointing anticlimax. For a moment one might be inclined to take it as a charming inconsistency such as Osler had already permitted himself in 1882 in regard to the problem of human freedom.[9] But in the Ingersoll Lecture Osler does not betray any trace of bad conscience; he boldly asserts his belief, and this in spite of the fact that he himself has proved that the basis for a scientific decision is lacking. How can this attitude be explained which so little becomes a scientist, not to mention an agnostic, and which is expressed not in terms of religious language but in those of a philosophical creed? It can only be understood if one remembers the teaching of that man who, as Osler admits in the same lecture, has most profoundly studied "the cardiac side of life's problems" which is opposed to the head, the representative of science.[10] James had insisted that in all "living options" man cannot afford doubt. He had attacked Huxley and Clifford who held that it is not permissible to believe where the evidence is insufficient, that under such circumstances doubt is the only honorable attitude. In 1897 he had defended the cause of the will to believe, or of the right to believe as he phrased it later on, especially addressing himself to "academic audiences." [11] Osler's confession of faith, I suggest, reflects the Jamesian position. At least since the year 1901 he had shown great interest in the importance of faith for all activities of life. His survey of *Medicine in the Nineteenth Century* stresses the relation of faith to medical healing, of faith that after all, he says, is the "great lever of life." In 1903 he warns the students against trying to mix the waters of science with "the oil of faith." But "you can have a great deal of both if you only keep them

[8] *Student Life*, 138.
[9] Cf. above p. 275.
[10] *Student Life*, 133; cf. above p. 280.
[11] *Will to Believe*, 7 f., 18 and Preface, X. In *Some Problems of Philosophy*, 1911, 221, James speaks of "Faith and the Right to Believe."

separate. The worry comes from the attempt at mixture." [12] When in 1904 he speaks out for the belief in immortality, though it is unwarranted by the scientific evidence, he does so because he has come to realize fully the significance and permissibility of belief, even at the risk of being wrong. Avoidance of error, although a duty, is not the highest duty, and to be right in the sense that one does not accept what cannot be proved, is not the highest ideal: for, as James says, it " is attended with the same risk of losing the truth." [13]

Osler, then, has abandoned agnosticism, he has accepted the Jamesian philosophy of belief. This change in attitude implied that sooner or later he would be driven also to embrace James' concept of truth which is so closely interwoven with James' psychology and brought out most poignantly in his works on pragmatism. Fundamentally, James holds, it is not so much by thinking as it is by acting that man arrives at an understanding of himself and of the world. Thought has no access to the truth of things because truth is not the copying of realities, but the working out of ideas.[14] That James' remark, " we live forward, we understand backwards," for Osler was a " remark that clung " attests that in 1908 he was indeed on the way to interpreting the intellect in the categories of James. This pithy saying, quoted by James from the existentialist Kierkegaard, nicely summarizes the attitude of the pragmatist as well.[15] In 1913 it is evident that Osler has been fully converted to the tenets of the movement to which he had given allegiance in an ever increasing measure. For to the eternally recurring question, " What is life? " Osler urges the students to give the answer: " I do not think—I act it; the only philosophy that brings you in contact with its real values and enables you to grasp its hidden meaning." Carlyle's distinction between what lies at a distance and what lies near at hand, of which Osler had been so fond since his youth, and the Hunterian " do not think, but try " attitude of mind, which he recommended in 1905 as " the important one to cultivate,"—both have received in the statement of 1913 the reformulation that is appropriate for the modern pragmatist.[16] Osler at the beginning of his speech may still claim that he has never been worried by any philosophy higher than that of the shepherd in *As You Like It*—one must not forget that this philosophy for him, as he had said

[12] *Aequanimitas*, 272 (the return to psychical methods of cure is " a third noteworthy feature in modern treatment "), 382.

[13] *Will to Believe*, 11, 18.

[14] *Pragmatism*, e. g., 55 ff., 197 ff.

[15] Cf. above p. 282.

[16] *Student Life*, 95; for Carlyle cf. above p. 272; for Hunter, *Student Life*, 17.

nine years earlier, was "frankly pragmatic"[17]—but the shepherd no doubt would have been aghast at the intellectual refinement, the categorial precision with which his philosophy was now characterized. He would at best have recognized the content of his creed; for the message which Osler defends is, to be sure, still the same. It is living for the day or what once he had called the Master-Word in Medicine: "Work."[18] Yet even the form in which this gospel is presented in 1913 seems deeply influenced by James' concept of truth and his consequent denial of all universally valid assertions. For it is significant, I think, that Osler speaks of his message as "a Way," an "experience," a "path," not "a system," a "habit," in short "A Way of Life."[19] As James says in the subtitle of his *Pragmatism*, this term is but "a new name for some old ways of thinking," and in the text he maintains that pragmatism "has no dogmas, and no doctrines save its method. As the young Italian pragmatist Papini has well said, it lies in the midst of our theories, like a corridor in a hotel. Innumerable chambers open out of it."[20]

Having accepted the epistemology of the new creed, Osler redefined also his relation to religion and to the social question in terms reminiscent of the debates that took place among the adherents of the movement, little as his attitude itself changed in regard to the issues at stake. As for Christianity, he had as early as 1903 expressed his belief that its true meaning was identical with Carlyle's demand that man be mainly concerned with the present. In proof of this contention he quoted the words from the Sermon on the Mount: "Take therefore no thought for the morrow: for the morrow shall take thought for the things of itself." The same words he chooses as the motto of his *Student Life* where he once more outlines the course to be followed by the practitioner and by the researcher in their daily efforts.[21] Eight years later, he discourses at length on his conviction that Carlyle's aphorism which had so deeply influenced him, and the Christian message aim at the same truth: "Sufficient unto the day is the goodness thereof." He takes the fact that "the workers in Christ's vineyard were hired by the day," not in the spirit of Oriental resignation or of Epicurean enjoyment, but "in the modernist spirit"—it is a call to action, "a way of life, a habit," which later on he describes by saying: "Look heavenward, if you wish, but never to the horizon—that way danger lies."[22] Jamesian as are the in-

[17] *Student Life*, 105; cf. *ibid.*, 76.
[18] *Aequanimitas*, 374.
[19] *Student Life*, 2.
[20] *Pragmatism*, 54.
[21] *Aequanimitas*, 381 (cf. also 473); *Student Life*, 2.
[22] *Student Life*, 80 f., 86.

sistence on the value of habits and the phraseology used by Osler throughout this speech, such a definition of Christianity certainly was not in contradiction to James' opinion that religion concerns " the way an individual's life comes home to *him*, his intimate needs, ideals, desolations, consolations, failures, successes," whatever James' attitude toward Christianity in particular. Osler's interpretation reminds one also of Dewey's contention that Christianity in its very intentions was a pragmatic movement, yet was deflected from its predestined course because in the time of its origin there was still lacking a philosophy capable of providing the adequate theoretical formulations that were needed.[23]

Apart from what Christianity may mean to the individual, however, for Osler it also had a social message which, as he thought, was only too often overlooked by his contemporaries. For " generations of ancestors, brooding over ' Providence, foreknowledge, will and fate, Fixed fate, free will, foreknowledge absolute,' may have bred a New England conscience, morbidly sensitive, to heal which some of you had rather sing the 51st Psalm than follow Christ into the slums." [24] As he had said in 1903: " The essence of that oft-repeated admonition of Christ, ' He that findeth his life shall lose it, and he that loseth his life for my sake shall find it ' " is " that we are here not to get all we can out of life for ourselves, but to try to make the lives of others happier." For " the law of the higher life is only fulfilled by love, i. e. charity." [25] But he was not afraid to add to the content of this message: the care of the body which the Greeks neglected as far as the common man was concerned and which the New Testament completely ignored, will become a main task of society.[26] In another mood he could speak of a new socialism of science that will arise and " with its definite mission cares not a rap for the theories of Karl Marx, of Ferdinand Lasalle, or of Henry George; still less for the dreams of Plato or of Sir Thomas More—or at least only so far as they help to realise the well-being of the citizen." [27] This is man's redemption of man, and it will go far indeed in mitigating the evils of the world. One might

[23] For James' attitude toward religion, cf. Perry, II, 329; cf. also 357. For his theory of habits, *Psychology*, I, 104 ff.; *Talks to Teachers*, 64 ff. For Dewey, cf. *Beliefs and Existences* [1905], in *The Influence of Darwin on Philosophy*, 1910, 177 f. Osler had long ago expressed his belief that religion had gained by being freed from dogma, cf. above p. 274. For the Lord's Prayer to be recited by the creedless and the creed-stuffed, cf. *Student Life*, 97.

[24] *Student Life*, 83; cf. above p. 272.

[25] *Aequanimitas*, 385 f.

[26] *Student Life*, 54, 69.

[27] *Ibid.*, 69 f.; cf. James, *Memories*, 267 ff. (*The Moral Equivalent of War*), published the same year. James asks for general conscription in the interest of the community.

well call such a gospel a new humanism, although Osler gives its quintessence in the words of the Greek philosopher Prodicus, " that which benefits human life is God." When he selected this phrase he hardly failed to remember that other pragmatic humanism, for which Protagoras' statement, " man is the measure of all things," was the watchword.[28] Yet whether this socialism be Christian or scientific or humanistic, the optimistic ring of Osler's assertions must not deceive one into believing that he hoped for more than an improvement of external conditions, of material welfare, or that he would admit now that the *civitas Dei* could ever be realized in the *regnum hominis*. In the comedies and tragedies of life the immutable human nature of men of today reacts very much as in the dawn of science, though with a widening of knowledge " the lights and shadows of the landscape have shifted, and the picture is brighter." [29] James, too at the end of his life trusted in the socialism of the future, but he would hardly have retracted the statement which he made in 1897 in a book from which Osler quoted three years after he had given his final verdict on man's fate just referred to: " Society has, with all this, undoubtedly got to pass toward some newer and better equilibrium, and the distribution of wealth has doubtless slowly got to change: such changes have always happened, and will happen to the end of time. But if, after all that I have said, any of you expect that they will make any *genuine vital difference* on a large scale, to the lives of our descendants, you will have missed the significance of my entire lecture. The solid meaning of life is always the same eternal thing,—the marriage, namely, of some unhabitual ideal, however special, with some fidelity, courage, and endurance; with some man's or woman's pain.—And, whatever or wherever life may be, there will always be the chance for that marriage to take place." [30]

Osler never gave assent to those who hold that the course of the things in this world, of human happiness or unhappiness, is determined by institutions rather than by man's character and will. As James had expressed it: " No outward changes of condition in life can keep the nightingale of its eternal meaning from singing in all sorts of different men's hearts. That is the main fact to remember." [31] Perhaps it was this

[28] *Student Life*, 70; cf. Cushing, II, 228 f., 220 f. For Schiller, *Humanism*, XVII, 31. Osler owned a copy of Schiller's article on *Plato or Protagoras?* published in 1908 (*Bibliotheca Osleriana*, no. 226).

[29] *Student Life*, 69.

[30] *Talks to Teachers*, 298 f. For James' increasing interest in socialism after 1897, cf. M. Curti, *The Social Ideas of American Educators*, 1935, 438 ff.

[31] *Talks to Teachers*, 301.

unwavering belief in the individual which allowed him to cling to his optimism, such as it was, even in the face of the disillusionment of the war years, of the annihilation of hopes and expectations which he had harbored for his age. When in 1919 he took the rostrum for the last time, he had watched men submit to hate, he had seen the discoveries of science, which can do so much to help mankind, misused for destruction.[32] He still contended that a solution of all difficulties could be found. As he says, "two things are clear: there must be a very different civilization or there will be no civilization at all; and the other is that neither the old religion combined with the old learning, nor both with the new science, suffice to save a nation bent on self-destruction." Reforms are needed. "The so-called Humanists have not enough Science, and Science sadly lacks the Humanities." [33] Even if this fault is remedied, however, still more has to be done. "The gospel of the right to live, and the right to live healthy, happy lives, has sunk deep into the hearts of the people." It can become reality only if there exists in man "the love of humanity associated with the love of his craft!—philanthropia and philotechnia—the joy of working joined in each one to a true love of his brother . . . perhaps in this combination the longings of humanity may find their solution, and Wisdom-*Philosophia*-at last be justified of her children." [34] But how is this salvation to be achieved? In giving the answer Osler—he is addressing classicists!—appeals to Plato: "The salvation of science lies in a recognition of a new philosophy—the *scientia scientiarum* of which Plato speaks." On this "synthetic process" Osler hesitates to dwell in detail; he has not mastered philosophy.[35] He is quite outspoken about the salvation of man, for with Plato he has "realized that after all the true State is within, of which each one of us is the founder, and patterned on an ideal the existence of which matters not a whit. Is not the need of this individual reconstruction the Greek message to modern democracy? And with it is blended the note of individual service to the community." [36]

I have come to the end of my interpretation of Osler's opinions. This much, I think, has been shown: it is most likely that in his early writings he was dependent on James; that he was so in his later essays is certain. Among all the contemporary philosophies that of James seems to have had the greatest bearing on Osler's thought. Of course, as James said

[32] *Old Humanities*, 11 ff., 48.
[33] *Ibid.*, 19, 34.
[34] *Ibid.*, 63 f.
[35] *Ibid.*, 54 f.
[36] *Ibid.*, 62.

himself, pragmatism was used in fragments by many previous thinkers; it is only its universal mission that has been recognized by him.[37] Osler's inclination toward pragmatism, if not merely a matter of temperament, may have been derived from many a philosophical system of the past with which he was familiar, or even from many medical authors whom he studied. Nevertheless, the influence of James, in my opinion, was decisive. For Osler's pragmatism, as it finally evolved, took on the hue of the specific modern formulation given to pragmatism by James and his followers.

I fully realize that my analysis is not exhaustive. I have paid little attention to Osler's ethical precepts which were shaped largely by his "lifelong mentor," Thomas Browne.[38] Especially the practical aspects of his teaching, his statements about self-education, about universities, about scholarship would deserve a more careful scrutiny. It is indeed of interest to ponder over such pronouncements as: "The present remarkable position in applied science and in industrial trades of all sorts has been made possible by men who did pioneer work in chemistry, in physics, in biology, and in physiology, without a thought in their researches of any practical application," or: "The value of a really great student to the country is equal to half a dozen grain elevators or a new transcontinental railway."[39] I have intended to give but a certain point of view that in my opinion must be taken into account by those who wish to understand the theoretical foundation of Osler's philosophy.

For looking back to the beginning of my discussion, I make bold to affirm that Osler had a philosophy. Any attempt to deny this in spite of the facts adduced would lead to a merely verbal argument about what is, or can be called, philosophy. Osler certainly had a consistent attitude toward life and its problems. It would also seem unjustifiable to me to dub his philosophy simple or even to restrict it to the province of medicine. It was well rounded out, it concerned itself with a multitude of general issues. If Osler himself claims that he was "neither a philosopher nor the son of a philosopher," that he "never mastered philosophy" because "cheerfulness was always breaking in," then I feel allowed to see in such assertions no more than the humility which befits him who is not an original thinker, a humility itself couched in the language of cheerfulness, of that jocular pretense so well known to Osler's friends.

[37] *Pragmatism*, 50.

[38] Cushing, II, 660; cf. *Alabama Student*, 277: "Mastery of self, conscientious devotion to duty, deep human interest in human beings—these best of all lessons you must learn now or never: and these are some of the lessons which may be gleaned from the life and from the writings of Sir Thomas Browne."

[39] *Student Life*, 13, 12.

APPENDIX

Two letters from James to Osler are preserved in the *Bibliotheca Osleriana*. The one is inserted in the copy of *Pragmatism* (no. 3074) and has been published by Cushing (*Life*, I, 119 f.), with the exception of the second paragraph and the ending. The other is inserted in Osler's copy of *Some Problems of Philosophy* (no. 3075) and has been hitherto unpublished. I am indebted to Dr. W. W. Francis for sending me transcripts of the letters and for allowing me to print both documents.

95 Irving St.,
Cambridge.

April 3.08

My dear Osler;

I thank you for your letter of March 24th., but listen to how it is with me! I find myself in a state of as bad nervous fatigue as I have ever been in my life, and that says a good deal. Today, e. g., awake since 2.30, and had to stop work on my 5th lecture (out of 8) after two hours because of flushed head. Three-hour-long dinner parties tire me badly; and if I succeed in getting thru my lectures themselves, I shall be lucky. This is not to *com-* but only to *ex*-plain why the notion of being "lionized" in any way whatever at Oxford strikes terror into my rabbit-like heart. So *don't* invite your London MD.'s to meet me! All that I am good for under present conditions is a few more intimate talks with old (and new) Oxford friends.

Your offer to help in lodging us is ultra kind, but I have already written to Principal Carpenter to look out for lodgings, so I won't tax you.

Don't consider me churlish, for I *ain't* but believe me with thanks and regrets, yours very sincerely,

(signed) Wm. James

Lamb House,
Rye,
Sussex.

May 3rd. 1910

Dear Osler,

Your letter of inquiry and friendly invitation arrives on the day on which I should in any case have written to you myself, having just decided to leave here for Paris on Thursday, my wife remaining with the invalid [*sc.* Henry James].

The case as it develops becomes more and more plainly one of melancolia, 'simple' in that there are no fixed or false ideas,—apart from the remains of his belief that the 'cause' of the whole thing is diet and no functional bodily complications. The type tends to agitation rather than to taciturnity, and he fluctuates a good deal from day to day, but until yesterday had had no complete remission of anguish for 10 or 12 days. Suddenly, the night before last, he grew bright, woke without the usual trepidation etc. & had a first rate day yesterday, and is all right this morning again.

Skinner is a first rate intelligent fellow (though with no special genius for this sort of case) and thinks that any change of scene for him now is the desirable thing—and we shall work him in that direction. Of course we are prepared for a long illness, but the remissions (which to my mind seem independent of assignable outward influences) show that the disease is relatively superficial, and that the final improvement may begin at any time. I am taking short views at present! Henry has a peculiarly good relation with my wife, so I leave them with a good conscience.

My anginoid pain has increased during the past year, tho' nitro-glycerin stops it like magic. I go to Paris to consult one Dr. Montier, whose high frequency currents have performed a *wunder kur* on a neighbor of mine (reducing his arterial tension from 230^{mm} to 150 in four applications) with a relief of all his formidable symptoms, that has now been complete for six months! I know of two cases of similar relief by him, tho' I am unacquainted with the details. It sounds impossible, and I hear that M. is regarded as a quack by medical opinion. Nevertheless I don't wish to leave that stone unturned, since my own trouble (in which I gladly acknowledge an element of nervous hyperaesthesia) seems progressive. I will let you know the results!

I am postponing all social and other flurries until this experiment shall have been tried. I thank you heartily for your most useful services to H. J., and of course will try to see you at I hope no very distant date.

Very sincerely yours,
(signed) Wm. James

P. S. I ought to tell you that your advice in my daughter's case—you may remember that my wife took her to consult you about threatenings of appendicitis, (you refused all fee!!) was fully corroborated by events. She was rather "run down" after two years of college, and with the resumption of good nervous tone, her iliac pains have quite disappeared, as you prophesied they probably would. Thanks again!

NICOLAUS POL DOCTOR 1494 [1]

MAX H. FISCH

At Ludwig Rosenthal's Antiquariat in Munich some forty years ago, Maurice Ettinghausen, fresh from his studies at Oxford and Paris, was learning the business by going over the incunabula in the warehouse at the back of the store. His interest was aroused by a group of incunabula and early sixteenth century books in bindings of stamped brown leather over wooden boards. Inside the front covers was the inscription: "Nicolaus Pol Doctor 1494." Above the inscription in most of the volumes was a list of their contents in the same hand. In several other hands, usually at the top of the first printed page, was the note: "Property of the Collegiate Church of Innichen 1632." There were shelf letters on the tail edges. The group contained about thirty titles, all medical, spanning the half century from 1477 to 1527.

One of Ettinghausen's duties was interviewing English-speaking visitors. Here was an obvious collection to show the physicians among them. He showed it to Dr. Edward Clark Streeter of Boston in 1907, and Streeter bought it for eight hundred dollars.

Twenty years later Ettinghausen, now head of Maggs Bros.' Department of Foreign Books, returned the call in Boston and bought the collection back for five thousand dollars. Maggs Bros. added Pol's 1495 Ketham with two other medical incunabula bound in, and issued in 1929 a *Catalogue of Medical Works from the Library of Dr. Nicolaus Pol*, offering the lot for £2500.

Through a clerical error, Dr. Harvey Cushing did not receive a copy of this catalog, but his nephew Dr. Edward H. Cushing of Cleveland did. He promptly persuaded President Vinson of Western Reserve University to cable for the collection and hold it until the Cleveland Medical Library

[1] A book of the same title will be published shortly by Herbert Reichner for the Cleveland Medical Library Association. It will include a fuller account of Pol's life, a critical text and translation of his guaiac tract, and a short-title catalog of about four hundred and fifty books and manuscripts now known to have belonged to his library, with their present locations. Since the book will be adequately documented, it will suffice here to say that the first six paragraphs of the present paper are based on letters of Dr. Ettinghausen to the author and on correspondence generously placed at his disposal by Dr. Edward H. Cushing and by the Historical Library of the Yale University School of Medicine; the last two paragraphs on examination of the manuscript listed in the *Index Catalogue*, 3d ser., vol. VII, p. 1053, under the head of "Medical tracts"; and the intervening paragraphs on Ferrari's article cited in n. 3 below, and on Arnold Klebs's summaries of the documents used by Ferrari and of some others in the Innsbruck archives.

Association could raise the money. This was soon supplied by a donor who asked to be nameless, and the collection came to rest in the Cleveland Medical Library as a memorial to Mr. Charles H. Bingham.

When Harvey Cushing came to Cleveland in May, 1929, to see if he could "lend a hand to Crile after the catastrophe in the Cleveland Clinic," his nephew told him the news, and he wrote to Streeter: "It is a perfect windfall for them."

The Maggs Bros. catalog had said: "One day there may be sufficient material for a worthy monograph on the distinguished collector of these books, but at present pitifully little is known. . . ." The Cushings set about collecting the material.[2] They enlisted the help, among others, of Arnold Klebs, who had been puzzled by the autograph, "Nicolaus Pol Doctor 1494," ever since meeting it fifteen years before in the Army Medical Library's 1490 edition of Galen. Klebs made inquiries in various directions and finally in 1936 got track of documents in the archives at Innsbruck from which the essential facts of Pol's life could be determined.

Meanwhile, Luigi Ferrari, librarian of St. Mark's in Venice, had visited Innichen to list the Collegiate Church's incunabula for the Italian census. He had found Pol's autograph in 133 volumes containing 169 out of a total of 272 incunabula, and also in 166 out of 309 books of the first two decades of the sixteenth century, and in 25 manuscript volumes as well. He had had the archives at Innsbruck searched just ahead of Klebs, and in October 1936 he reported the results of these and other investigations in an article on Pol, the Collegiate Church of Innichen, and its incunabula.[3] He appended a list of the incunabula, but without distinguishing Pol's from the rest, and without listing the sixteenth century books and the manuscripts.[4]

[2] They also bought most of the Pol books that came on the market. Between 1930 and 1936 Harvey Cushing acquired nine volumes with Pol's *ex libris*, containing eight incunabula and five sixteenth century books. These are now in the Historical Library of the Yale University School of Medicine. The Cleveland Medical Library's collection has grown from 33 to 38, largely on the initiative of Edward H. Cushing, who has one Pol book in his private library as well.

[3] Ferrari, Luigi. Doctor Nicolaus Pol, la Collegiata di S. Candido ed i suoi Incunaboli. *Atti del Reale Istituto Veneto di Scienze Lettere ed Arti* 96[2]: 109-169 (1936-37).

[4] Dr. Ferrari has recently supplied a complete list of Pol's books at Innichen (San Candido), and Canon Ferdinand Keim of the Collegiate Church informs me that they came safely through the war and are still intact. Dr. L. Franz of Innsbruck has sent a list of fourteen of Pol's incunabula in the University Library there. The British Museum has at least three of Pol's books, the Army Medical Library 2, the Library of Congress 1, Boston Public 1, University of Chicago 1, Huntington 1, University of Michigan 1, Dresden 1, Vienna 1, Erik Waller 2, and Lathrop Harper a volume containing four extremely rare incunabula. It has not been possible to include in the present paper an

All that was previously known of Pol was that he was the author of a tract on the guaiac treatment of syphilis printed at Venice in 1535 but dated at the end December 19, 1517. On the title page and again in the dedication to Cardinal Matthew Lang, Pol was called (or called himself) "professor of medicine and physician to his sacred imperial majesty." It was not known where he had taught, nor whether the Emperor meant was Maximilian I or Charles V.

The documents brought to light by Ferrari and Klebs tell us nothing of Pol's parentage or of the place or date of his birth, but they suggest that he was born in the Tirol about 1470 or a little earlier. On September 26, 1487, he entered the service of Duke Sigismund at Innsbruck, with the miserable stipend of twenty florins a year. In Sigismund's account books for 1488, 1489 and 1490, he appears as court distiller or pharmacist. After Sigismund's abdication in favor of Maximilian in 1490, Pol continued to serve him for at least a year, as appears from two pharmacy bills of 1491, one for an enema administered to the Duke on March 15, and the other for 2½ ounces of pills on the 20th of the same month. We then lose track of him for four years and nearly eight months. On November 3, 1495, he was appointed physician to Maximilian and to his governors at Innsbruck, where Pol agreed to reside and be on call. It is evident therefore that in the intervening period he had studied medicine and that the year celebrated in his *ex libris* autograph was that in which he had obtained his degree.[5] His salary as physician was 100 florins a year. Though still not large, it was five times what he had received as court pharmacist. It is probable that he served the Emperor only when the Emperor's court was at or near Innsbruck, but that he was available at any time to the local governors or to imperial emissaries passing through. His appointment was confirmed on April 26, 1500, and again on May 9 with the added provision of two horses whenever they should be needed in the performance of his duties. Possessing as yet no seal of his own, Pol was obliged to have a court official affix his to this last document.

There was at that time no university at Innsbruck, but Pol seems to have taken students and to have acquired a reputation for learning. We hear

analysis of Pol's library in relation to other private medical libraries of his time. The proportion of theological and philosophical books was high. Ramon Lul was his favorite author. Further details will be given in the book referred to in n. 1.

[5] It is probable, however, that the year 1494 had some additional, perhaps symbolic, significance for Pol. One of his marginalia dates from that year the rapid spread of syphilis, which was the outstanding problem of medicine in his time, and from the treatment of which (if not more directly from the guaiac trade itself) he must have derived the income that enabled him to accumulate so splendid a library.

of a monk who, before entering the monastery of SS. Ulrich and Afra at Augsburg in 1503, had studied with Pol at Innsbruck. The phrase "professor of medicine" may mean no more than that.

In a document of November 6, 1517, Pol first appears as a man of property, owning a house on the Silbergasse in Innsbruck and receiving a rental from it. That was six weeks before he completed his tract on the guaiac cure. To this document he did at last affix a seal of his own, but it has since disappeared.

We find no record of Pol for the next fifteen years, but it would seem that he passed from Maximilian's service to that of Charles V in 1519, and that he continued to live at Innsbruck. Two documents in the archives there serve to fix the year of his death. On March 22, 1532, he received and paid for a shipment of wine from a provisioner at Feldkirch in Voralberg. On November 19 of the same year, the treasurer at Innsbruck was ordered to pay his widow Apollonia, for a period of five years, an annual pension of 50 florins, in consideration of the long, faithful and diligent services of her husband.[6] Pol must therefore have died between March and November, 1532, at an age of perhaps sixty-five years, thirty-seven of which he had spent as physician to emperors.[7]

Pol's son John became a physician after him but achieved no such distinction. He died at Znaim, leaving behind a manuscript collection of recipes, a veritable encyclopedia of pharmacy and hygiene, compiled by his father, with some additions of his own. The City Council of Znaim, to whose custody it passed, lent it to one Dr. Wolfgang Käppler as security for a debt they owed him. Käppler copied and enlarged it and gave it the title, "A most useful compendium containing the causes and remedies of the various diseases." In his preface he speaks of the original compiler as having been "vastly learned" and a councilor as well as physician to

[6] From the same document we learn that Pol left minor children, and from another that in 1536 his widow was administering a house he had owned on the Kugelgasse at Innsbruck. She was still living in 1541, for a note in one of the volumes at Innichen says it was bought from her in that year.

[7] The Venetian diary of Marin Sanudo records, among other personages arriving in Venice from Treviso with troops of Charles V on October 23, 1532, a "Doctor Polo, His Imperial Majesty's preacher." Though we have found no other mention of Pol's having served in that capacity, it is not inconceivable that he did so. Theology bulks even larger than medicine in his library; theological study often went with medical practice in his time; and a dual rôle of court physician and chaplain was not without precedent. Travel with the court or army of Charles V in one or both capacities between 1519 and 1532 would help to explain Pol's absence from Innsbruck records of that period. If the Venetian visitor was indeed our Doctor Pol, it would follow that he died late in October or early in November 1532, probably in Italy and perhaps at Venice, where, three years later, his guaiac tract was first printed.

Maximilian I. Aside from Pol's guaiac tract and the marginalia in his books, this is the only surviving product of his literary activity.

Of the guaiac tract itself there was no trace earlier than the edition of 1535 until a manuscript copy of 1519 was recently discovered in the Army Medical Library. In that year one Ippolito of Montereale, a medical student at Perugia, was living in the home of his teacher Lorenzo of Sassoferrato and making copies for his own use of various medical manuscripts in Lorenzo's possession. On the 13th of May, 1519, he transcribed Pol's tract from a manuscript copy which Lorenzo had received from Alberto Pio of Carpi, Maximilian's advocate at the Papal See, to whom it had been sent as a gift from Germany, perhaps by Pol himself, more likely by his patron Cardinal Lang.[8]

Following Pol's tract in Ippolito's manuscript there is a recipe for the guaiac treatment from Seville, Spain, which Lorenzo had obtained on June 22, 1516, from a spice dealer who refused to show it except to his intimate friends. This latter document now supersedes Pol's tract as the earliest surviving record of the use of guaiac in the treatment of syphilis.

Postscript: When the above paper was already in type, a letter from Dr. L. Franz of Innsbruck called my attention to an article by Ernst Zinner in the *Bericht der Naturforschenden Gesellschaft in Bamberg* (v. 28, 1939) which gives the substance (p. 94) of a letter from Pol to Veit Bild in the Diocesan Library at Augsburg. Bild was the monk of SS. Ulrich and Afra who had studied with Pol at Innsbruck. He wrote Pol in 1517 asking how the magnetic declination for Augsburg could be ascertained. Pol replied on June 15, 1520, pleading domestic misfortune and illness in excuse of his long delay. Without saying how it had been determined, he gave 11° as the declination at Innsbruck and said the declination at Augsburg would be nearly the same. Pursuing this lead, I have compared Benedikt Kraft's catalog (1934) of the manuscripts in the Diocesan Library with Placidus Braun's (1791-96) of those formerly at Ulrich and Afra. It appears that the Diocesan Library's manuscript 81, if it has survived the war, should contain eight letters from Bild to Pol and five from Pol to Bild. On further search, I find that brief summaries of these and other letters in the same manuscript were appended to an essay on Bild by Alfred Schröder in 1893 (*Historischer Verein für Schwaben und Neuburg, Zeitschrift* 20: 173-227). I am endeavoring to secure copies of the letters themselves.

[8] This provenance is made doubly interesting by the fact that, appended to the 1535 edition of Pol's tract, there is an account by Alberto Pio of the German method of making beer.

THE BUBONIC PLAGUE IN ENGLAND: A PROBLEM IN PUBLIC HEALTH

CHARLES F. MULLETT

As Macaulay's omniscient schoolboy would know, England had had a millennium of pestilence before the London plague of 1665.[1] Although it had indelibly fissured the mind and institutions of the country, historians have disregarded the years before 1349 and created the impression that no serious epidemic attacked England between 1350 and 1603. They have, it is true, attached the greatest significance to the Black Death, but in most accounts it stands as a unique phenomenon not as the first of a series that continued for 320 years.[2] Writers, assuming that this tragic visitation ran its course in a couple of years, have failed to appreciate that the consequences attributed to it were less the fruit of the Great Pestilence than of recurring epidemics; and they have treated most casually the plague's career during the next two and a half centuries. Even for the 17th century they have mentioned but three, or at most, four dramatic episodes, and only the 1665 plague gets into most textbooks. Yet in nearly each of 320 years, 1348-1668, some community suffered, and on several occasions a considerable region was devastated. Moreover, even after England had ceased to harbor the pest, the threat from nearby countries inspired legislative action and medical description for nearly a century.[3] Irrespective of neglect by historians, testimony of these epidemics and their consequences has survived for many and diverse areas. A colorful, extensive literature

[1] Bede, *The Ecclesiastical History of the English Nation*, bk. I, ch. 14; bk. III, ch. 30; bk. IV, ch. 14; William A. Guy, *Public Health: a Popular Introduction to Sanitary Science* (London, 1870), 46; William Hunt, *The English Church from its Foundation to the Norman Conquest* (London, 1901), ch. vi.

[2] An excellent introduction is G. G. Coulton, *The Black Death* (New York, n.d.). See also Johannes Nohl, *The Black Death* (London, 1926), Cardinal Gasquet, *The Great Pestilence* (London, 1893; reprinted as *The Black Death*, London, 1906), A. E. Levett, *The Black Death on the Estates of the See of Winchester* (Oxford, 1916), Frederic Seebohm, "The Black Death and its Place in English History," *Fortnightly Review*, II (1865), 149-60, 268-79; "The Population of England before the Black Death," *ibid.*, IV (1866), 87-90, J. T. Rogers, "England before and after the Black Death," *ibid.*, III (1866), 191-96, A. E. Jessop, *The Coming of the Friars and other Historic Essays* (London, 1901), 166-261. *Cf.* John Saltmarsh, "Plague and Economic Decline in England in the Later Middle Ages," *Cambridge Historical Journal*, VII (1941), 23-41.

[3] Charles F. Mullett, "Sir William Petty on the Plague," *Isis*, XVIII (1938), 18-25; "The English Plague Scare of 1720-23," *Osiris*, II, pt. ii (1936), 484-516.

has centered attention on a few years of the 17th century, but this in no sense warrants indifference to other periods.

No epidemic has been assessed on the same scale as the Black Death because none had so titanic an impact, but neglect of later periods may in some measure reflect the attitude of contemporaries whose experience with the plague allowed familiarity to consummate its proverbial destiny, or whose knowledge lessened the shock by anticipating the disaster. In contrast to the all-embracing despair engendered by the Black Death and its recurrent manifestations, the Tudor and Stuart Age, though fully aware of immanent tragedy, did not cast up its accounts in terms of the plague. The very constancy of the threat reduced fear. Because the plague did come and often conquered, however, its diverse and penetrating consequences—the carrying off of a large percentage of the population in a given locality, the upsetting of political, social, and economic routine, the disruption of thought and habits—call for fuller integration with contemporary life. The numerous and varied efforts at control indicated clear realization of the plague's impact on social institutions; the authorities therefore fought intelligently to halt a scourge of far-reaching effects.

Whether the pestilence might have been stamped out, had the preventive regulations been systematically enforced, must remain unsettled. Despite rigorous governmental efforts, cleanliness and sanitation retreated before the increasingly crowded conditions of towns, within and without the walls. Historians, who explain the plague in terms of the lack of sanitary arrangements, the scanty supply of pure water, and congested living quarters, have disregarded London's primitive sewerage system and larger, more miscellaneous population for the 150 years after 1665. While these factors encouraged, even sired epidemics, to be unwashed and promiscuous did not in themselves cause the plague.

The mortality of the 16th and 17th centuries no doubt owed much to the greater movement of people within the country and immigration from abroad. Expanding domestic and external trade, agricultural enclosures and their attendant evictions, overseas contacts and the advent of new diseases which aggravated already existing difficulties, riots and disorders of every sort, all these increased exposure and in many instances weakened resistance. Though city magistrates forbade over-crowding in the town and country justices punished vagabondage in the shire, penalties did not halt evils.[4] Temporary and abnormal disturbances also intensified the

[4] For some accounts of policy see F. P. Wilson, *The Plague in Shakespeare's London* (Oxford, 1927), W. G. Bell, *The Great Plague in London in 1665* (London, 1924), and

crisis. In spite of precautions, coronation ceremonies in 1603 and 1625 swelled the London population which expanded continuously throughout the century. The Civil War created privations and impelled movements of people. In 1665 the Restoration had left London thronging with strangers.

The persistent threat constantly stimulated pamphlets from laymen and physicians, and local and national regulations. The latter, by emphasizing prevention above cure, often seemed more " modern " than the pamphlets.[5] The means used by the man in the street or the country lane, though illustrating the naïveté of contemporary medicine, should not on the one hand be neglected or on the other allowed to tell the whole story. By those able to make their attitude felt, the plague was regarded neither as symptomatic of God's wrath nor as an incomprehensible visitation to be propitiated through the mysteries of folklore, but as a phenomenon which could be regulated and restricted if not altogether prevented. Some of the naïveté credited to the past exists only in the minds of the historians.

Acquaintance with plague medicine forces a warning against oversimplification. Numerous cross-currents flow through the past, and no easy generalization ever erred on the side of accuracy. A student can substantiate almost any contention which in turn can as authoritatively be denied. Preventive medicine rubbed shoulders with folklore, quackery, with science; no group monopolized either of these. Common people practiced segregation; trained physicians tried any expedient, no matter how irrational, if it promised relief. All told then, the problem stimulated the broadest political, social, and intellectual consequences and cut across every barrier.

Mullett, " Some Neglected Aspects of Plague Medicine in Sixteenth Century England," *The Scientific Monthly*, XLIV (1937), 325-37; " The Plague of 1603 in England," *Annals of Medical History*, n. s., IX (1937), 230-47; and " The English Plague Scare of 1720-23," *loc. cit.* National and local ordinances, *inter alia*, required cleansing the streets, segregation, quarantine, and fumigation; prohibited crowds, fairs, plays, court terms, and trade; regulated burials and housing; provided pesthouses; appointed physicians, surgeons, apothecaries, and many special officials such as searchers, scavengers, and nurses; imposed penalties for avoidance of responsibilities; and collected aid of various sorts for plague victims.

[5] The pamphlets invariably contained a great deal of advice though it appeared in different guises. Some stressed cure, others preventive measures; some were graphically descriptive, others sharply controversial over causes and origins; some were elaborately theoretical, others terse analyses. Some urged a specific that never failed; others suggested a variety of treatments on the ground that one might work. Some were closely akin to governmental policies; others were equally hostile to them. Some were exclusively medicinal; others appreciated the broader social problems. The authors included clergymen, quacks, laymen, and the ablest physicians of the time, and there was no necessary correlation between the essential validity of the product and the author's profession.

Notwithstanding ample evidence for the 16th and 17th centuries, to define fully the plague's importance for that period would admittedly require almost endless investigation, including careful statistical calculation, and great skill in a variety of disciplines. Students of epidemiology have repeatedly pointed out the dangerous slough explored here;[6] and no adventurer can disregard either their warning or the dangers. Probably the initial difficulty concerns the definition of terms. *Plague* was a generic word, no more precise than *Fever* or *Flu*. While often indicating the true bubonic or pneumonic plague, it often applied to typhus or even some disorder for which no specific term existed or whose symptoms baffled the observer, a situation resulting from the difficulty of separating the true plague from the larger mass of ailments or from its accompanying scourges. Translation also presents troubles: diseases similar in symptoms were rendered as one; a disease hitherto unknown and therefore undefined might be translated as the disease it most closely resembled; like-sounding diseases might be translated as the same disease.

Equally difficult is placing the plague in proper relation to contemporary evolution. The mortality of any epidemic has never been exactly determined.[7] Given a reasonably well founded approximation of mortality, analysis of effects still baffles the inquirer. That normal governmental routine was halted, that industry, trade, and agriculture suffered extensively, that every epidemic cost heavily in losses and services, that social organization and cultural institutions were disrupted—these effects are obvious if not easily measured. But what of the intangibles? The impact on religion, on morale, on human vitality. Here inferences are our recourse, inferences standing on substantial evidence but still tentative.

London could with some material dislocation survive the occasional loss of a fifth of its population in a year, for it quickly replaced such losses. But how did the hysteria, the social and emotional unrest engendered by

[6] Geddes Smith, in the Foreword to *Plague on Us* (New York, 1941), warns with some asperity and pertinence that "though laymen are the stuff of which epidemics are made, they shouldn't meddle with epidemiology, which is an exacting science." Does this entitle a historian to say: "though laymen—and this includes epidemiologists—are the stuff of which history is made, they shouldn't meddle with history which is an exacting discipline and demands a penetrating imagination and comprehensive knowledge?"

[7] The Bills of Mortality, though of considerable value in determining the fatalities caused by the plague, are not very precise. It is well known that, because of the regulations concerning the plague and their attendant inconvenience, people tended to cover up plague deaths, and that the number of deaths attributed to other diseases mounted in plague years. Probably one would be justified in regarding the usual figures as about two-thirds the total of plague deaths.

that loss, affect crime, political ideas, economic institutions, and international policy? On the other hand, an obscure village or thriving market town could not afford to lose its adult males. How many such centers had a brief moment of glory before the plague blew out the candles? To what extent did an epidemic stimulate either for the towns themselves, the counties in which they were located, or even the country as a whole, policies far removed from the immediate crisis? If magistrates or merchants took steps to meet one emergency, did they not the more quickly extend the same steps or evolve similar ones to handle quite different situations? A people at war improvise expedients that will be applied in peace. Did not frequent or protracted epidemics produce similar consequences?

Although these questions have not been answered, and perhaps never will be in a definitive fashion, the lack can be remedied, not wholly but in part, by carefully analyzing myriad sources. The process is both fascinating and difficult because so much error has gone into history under the authority of great names, that the student seldom knows when fact ends and conjecture or even fiction begins. Historians have customarily implied that authorities did little to combat the plague,[8] that precautions were either unknown or inadequately applied, and that the plague was fought with ridiculous compounds of dung, toads, and herbs. Considerable evidence of course would sustain that view. Nevertheless, this belief, accurate enough for certain times and places, is not the whole truth; and the more testimony one gathers the more he must marvel that such an opinion could ever have passed for the complete story. Testimony exists in several dozen plague and health tractates, in official records—local, national, and ecclesiastical—in family papers, contemporary chronicles, the activities of the College of Physicians and the Royal Society, and in general literature. Of these, the tracts stand out, ranging as they do from old wives' tales to keen diagnoses and revealing both the technical outlook and the climate of opinion; but only by examining all the sources can we place the problem in true perspective. Bulky though the materials are, unexploited sources still exist for illuminating aspects of plague history now all too scantily known.[9]

This history, while not to be arbitrarily separated from general medical history, justifies particular attention. The plague produced a sharp and

[8] An example of this attitude is to be found in the otherwise excellent work by David Ogg, *England in the Reign of Charles II* (Oxford, 1934), I, 293.

[9] Business records, for instance, could throw a great deal of light on the economic side of plague history.

devastating crisis which took precedence over everything: no other disease demanded so much practical action. Out of the crisis came permanent health measures and sanitary devolopments which, ineffective as they seem to a modern specialist, laid the foundation for genuine advancement. Few radical changes, it is true, marked the policy and outlook of two and a half centuries, but variations there were; and though of degree rather than kind they necessarily prefaced the achievements of later years. Perhaps indeed changes were greater than appears, for the persistence of old terminology hid modification in outlook. That the plague was the first disease isolated in the bills of mortality should not go unremarked; nor should its contribution to general medical progress.

No one can doubt that the plague forwarded medical development. It stimulated preventive medicine and public health measures through governmental action; it brought higher standards of medical education and practice, municipal physicians, and dispensaries, increased the number of physicians, and inspired a large *corpus* of medical literature the value of which transcended its primary purpose. It contributed to the keeping of vital statistics and the isolation of diseases by which the study of epidemiology could be furthered through knowledge of the "occurrence, recurrence, and spread of communicable diseases." It encouraged sanitation, quarantine, and better housing; it developed awareness of environmental forces.[10] By increasing clinical data it advanced clinical medicine in an age which preferred the high *priori* way. It undoubtedly influenced and in some cases directly caused fruitful controversies between various types and schools of healers. Perhaps greatest of all, it inspired a large concept of civic responsibility, social and medicinal.

Not without value also is the light thrown by the plague on the history of epidemiology whose earlier characteristics were essentially descriptive but whose newer manifestations have been primarily statistical and analytical. Hippocrates studied epidemics in terms of locale, soil, wind, weather, temperature, and humidity; Sydenham used virtually the same approach. With the discovery of micro-organisms. scientists have deprecated the Hippocratic factors and viewed the epidemic constitution— "that the clinical character of a communicable disease . . . is altered by the climatic and telluric condition obtaining during the period sometimes to the exclusion

[10] The plague may also have delivered a double-barrelled blast at such mortal diseases as leprosy by carrying off a great number of their victims and by creating circumstances unfavorable to their survival. Perhaps, who knows, as the plague drove out leprosy, so other diseases reduced the incidence of the plague. For the relation between the plague and leprosy see H. E. Sigerist, *Civilization and Disease* (Ithaca, 1944), 233.

of other symptoms of the disease" — as sheer mysticism.[11] Consequently older chronicles of disease have unfortunately, from the historical and scientific viewpoint alike, been ignored; yet bygone epidemics and their attendant preventive measures have the utmost historical importance. Descriptions reveal that Hippocratic forces have modified epidemics and that observations of uncontrolled phenomena in the field possess equal value with controlled experiments in the laboratory. The plague itself fits perfectly the dictum that "a major epidemic is of remote and multiple causation" and "a coordinate series of happenings" involving human, animal, vegetable, microbic, and telluric factors, to which all persons are susceptible in varying degrees.

The plague also serves as an excellent case study in how not to write medical history. It is always the mistakes of the past, the "optimistic credulity," the superstitions that are emphasized. How, one is tempted to ask, did medicine emerge from its darkest Africa if some physicians did not have a soupçon of insight, if some authorities did not assemble a few stones for the foundation of better health? Men who ought to know better forget that modern medicine stands on the shoulders of earlier medicine; the old adage still holds, *ex nihilo nihil est*. On the other hand, no one can deny that epidemiological theories often led men astray, or that historians of epidemics have contributed no end to the wanderings in the labyrinth.[12]

This appears in the contribution of England's foremost historian of epidemics who, writing in 1891, might have been writing in 1691 so far as his viewpoint is concerned.[13] Creighton did not hesitate to declare that the plague virus was a "soil-poison" whose "quiescence or activity depends upon whether or not the state of the soil favors the fermentation of the special organic matters therein, which . . . we take to be the products of

[11] Fielding H. Garrison, "The Newer Epidemiology," in *Essays on the History of Medicine*, ed. by Charles Singer and Henry Sigerist (London, 1924), 255-68; Iago Galdston, "The Epidemic Constitution in Historic Perspective," *Bulletin of the New York Academy of Medicine*, XVIII (1942), 606-19.

[12] According to Geddes Smith (*op. cit.*, 34), "It would be easy to find abundant evidence of bewilderment, credulity, and ingenious wrongheadedness in the history of epidemiological thinking. One is tempted to set the crass ignorance of our ancestors over against our own gratifying intelligence, letting Pasteur mark the turn of the tide, and leave the matter there . . . It is not easy to keep a sound historical perspective in such a task" of following "the human mind as it has gradually come to grips with the ideas that are needed in the fight against epidemic death . . . For twenty centuries philosophers and physicians tried to understand the strange phenomena of disease with only the evidence of their unaided senses to guide them: they saw, heard, smelt what they could, and drew the best inferences they could think of. It is not surprising that mistakes were made; the questions were hard."

[13] Charles Creighton, *A History of Epidemics in Britain* (Cambridge, 1891), 658.

cadaveric decomposition. The conclusion that the poison of plague lay in the soil, and that it rose into the air in emanations or effluvia, was forced upon all those who thought much about the matter from the medieval period onwards." Three years later a series of discoveries completely overturned this notion and the historical generalizations founded upon it. Yet irrespective of the inaccuracy of earlier diagnoses, many antidotes and preventives fitted the new facts ; and the discovery of micro-organisms has given no more final answer than many older assumptions. If a bacillus alone accounts for the plague, 18th century England should have been plague-rotten since in many respects few more likely circumstances ever existed for its virulent activity. Furthermore, although introduced again and again into Europe and America since the early 18th century, the plague has shown no tendency to spread in epidemic form. The required delicate adjustment of many conditions has presumably failed to occur [14]

Admittedly its disappearance from England after 1667 is related to certain tangible factors : greater personal cleanliness through the use of cotton in place of wool, disuse of straw for floors and bedding, better streets, and the substitution of brick for wood as building material when London was subjected to the Great Fire and a succession of smaller ones as well as a chronic condition of falling houses. Of some importance also was the defeat of the black by the brown rat which immigrated in the later 17th century. When the browns beat the blacks to the food supplies, the latter took refuge on shipboard where they more than held their own. The browns were not only landsmen, however ; they also loved the great out-of-doors and their fleas came less frequently in contact with human beings, whereas the blacks were the home-loving type (without slippers and pipe) and their little guests freely attacked men and women.

The plague of course varied in type and in virulence ; it did not stand alone or follow a conventional pattern. It was often the inseparable, ferocious companion of typhus, and both were reinforced by dysentery, diphtheria, smallpox, and typhoid and scarlet fever. On top of all were famine and war.[15] No wonder the historian experiences difficulty in calcul-

[14] Hans Zinsser, *Rats, Lice and History. Being a Study in Biography, which, after Twelve Preliminary Chapters Indispensable for the Preparation of the Lay Reader, Deals With the Life History of Typhus Fever* (Boston, 1935), 91-93.

[15] Zinsser, *op. cit.*, 271, 274-75 ; Sigerist, *op. cit.*, 9, 112-13, 115. Chronicles of the plague at whatsoever period almost invariably report prefatory drought and famine. The months prior to the 1603 visitation suffered a great drought while those preceding the 1665 plague revealed a "great incidence of respiratory diseases." Drought and famine brought rats closer to man in their search for food, and also started people in motion with the same purpose, with the consequent spread of the plague.

ating the nature and effects of the plague. It might be bubonic or pneumonic, mild or severe, and in any given epidemic reveal all these characteristics and accompaniments, which complicated the problems of diagnosis and treatment. The pneumonic type spread germs by respiratory agents; the bubonic resulted only from the bite of the rat flea and might be spread by agents who remained uninfected. Although rat fleas thrive best at a humid 50°, in England plagues were most virulent in August and September when the temperature was rather higher, and diminished in November when the temperature was most appropriate. In general the bubonic plague was most active in summer and the pneumonic in fall and winter. The first plagues to invade England were pneumonic and the Black Death itself had pneumonic preliminaries. With the rat invasion about 1349, however, the bubonic plague got under way and during the 16th and 17th centuries it dominated the scene though no doubt pneumonic elements were often present.

Plague history illustrates the profit in the re-examination of data. Generations of historians have, whether intentionally or ignorantly fastened upon bygone political and medical authorities a genius for ineptitude, stupidity, even deliberate cruelty. They have frequently deplored the omission of policies which modern governments would hesitate to attempt or be unable to enforce; but numberless records make clear that preventive medicine, even as we understand it, was not born yesterday. Too long have the quaint recipes, characteristic though they were, been allowed to describe the quality of our medical past. How would we react to the assumption, derived from radio and other advertising, that patent medicines comprise the whole of modern medicine? As it takes more than a few test tubes to make today's doctor, it took more than their absence to make yesterday's quack.

Bizarre methods of fighting the plague thrived to be sure, but alongside stood the careful, intelligent observations of men who staked out a fair claim to be considered the harbingers of a more scientific day. Acute observations and exact experiments were by no means the exclusive product of the 19th century, nor have they entirely superseded practices which historical snobbery pleases to tag as "medieval."[16] Whatever the approach to past medical ideas and attitudes, comparisons, to avoid the usual charge, must be made between old and modern quackery, not between

[16] Measures evolved to fight the plague during the years considered here were applied after its true character was discovered. Sigerist, *op. cit.*, 28, notes that the medieval mask was found effective in Manchuria in 1910-11.

folklore and a present day clinic. To prove medical progress, writers should not compare a Nobel prizewinner with some nameless apothecary whose nostrums menaced his clients no more than those cure-alls of today's gigantic drug trust, hammered into public consciousness at any and every moment of the day, threaten the well-being of credulous purchasers.

That the sanitary *practice* of 1546 or 1646 was far removed from the *ideal* of 1946 goes without saying. But, is the practice of 1946 consonant with its own *ideal*? The historian must attend to the *ideals* as well as the *practices* of the past. No doubt many towns in plague days were indescribably filthy. Yet our own open sewers and scattered filth, not to specify the by-products of an industrial civilization which have defiled the air beyond any medieval midden, provide an insecure pulpit for preachments.

In conclusion let it be emphasized that the plague, because its powerful impact encouraged partial isolation at an early stage, constitutes an ideal medium for epidemiological study. This mortal, widespread disease, recurring over a long period, produced a tremendous and varied body of literature and filtered into every sort of intellectual expression. Many judgments, perhaps on the whole more foolish than wise, have passed into the pages of histories ; but, wise or foolish, these constitute a springboard for a plunge into a fascinating and significant problem. The data make clear the error of concentrating on a few years. In all probability the heaviest mortality (after the 14th century) did occur in 1563, 1593, 1603, 1625, 1636, and 1665. Preoccupation with these years, however, fails to convey either the plague's persistent threat in many unsung years, when magistrates and doctors sought to prevent administrative and social disruption, or its full impact as a problem in public health and preventive medicine.[17] Some plagues excited vastly more literature than others, and although the emphasis invariably goes to the epidemics with the largest mortality, the visitations were not always severe.[18] Indeed consideration

[17] Only in four widely scattered years between 1603 and 1667 was London reported free of the plague—and London was not all England.

[18] A mild plague, characterized by swellings in the armpits or groin, some temperature, with a duration of ten to twenty days, left the general health largely unimpaired and permitted the victim to go about as usual. In the severe variety the early symptoms resembled those of ague: the patient became distracted, staggered about, suffered from severe headache, thirst, and general pain. His eyes became red and turbid, his tongue swollen, dry, and fissured, sometimes black, sometimes white. Vomiting, fever, coma, and generally obstinate constipation (but occasionally diarrhoea) were other manifestations. Buboes, of which 45-50% occurred in the groin, 35% in the axilla, and the remainder in the neck, were special symptoms. The tokens or plague spots, so often referred to in English pamphlets, appeared a few hours before death and revealed the existence of sub-cutaneous hemorrhages. The "Black Death" took its name from the excessive presence of such spots.

of the endemic and mild nature of the plague for long intervals sets the whole story in truer historical perspective.

From the pragmatic view — the instruction of the medical reader — historical pathology fills a significant need, and no example surpasses the plague in importance. Epidemics have justifiably been the chief subject of medical history ; studying one disease for a long period and comparing its epidemic expressions give substance to this subject. The rise of bacteriology for a time brought the decline of historical pathology, yet "the experimental method cannot altogether replace knowledge of the historical manifestations of epidemics." [19] History poses questions which no laboratory can answer, notably in the appearance and disappearance of diseases, their varying intensity and extension, their unaccountable character and termination, and, above all, their unpredictable, even explosive, consequences and ramifications. The plague supplies repeated evidence of this.

[19] Owsei Temkin, "An Essay on the Usefulness of Medical History for Medicine," *Bulletin of the History of Medicine*, XIX (1946), 27-30. "Where history is lacking, mythology takes its place and those who disdain history are among the foremost victims of mythology." Medical history may act as a clearing house and synthesis for many branches of medicine and, by enabling men to see medicine whole, strengthen its humanistic side. *Ibid.*, 10, 36.

THE 150TH ANNIVERSARY OF S. T. SOEMMERRING'S *ORGAN OF THE SOUL*

The Reaction of His Contemporaries and Its Significance Today

W. RIESE

S. T. Soemmerring was 41 years old when he published his *Organ of the Soul*. This work was written during his twelve years' teaching anatomy and physiology at Mainz,[1] most active and happy period of his long and successful career. For reasons which will become obvious in this study, to the *Organ of the Soul* a special place must be assigned in the whole of his work. Physician, anatomist, physiologist, anthropologist, palaeontologist, physicist and inventor, Soemmerring preferred what we call the "exact" sciences and descriptive methods. It was just in Mainz that, five years before the publication of his *Organ of the Soul*, he exposed his scientific method in his catalogue of the Cassel collection [2] of human malformations:

> Except for some final remarks, he said, I describe them without drawing far reaching conclusions as to physiology and particularly as to genesis; it seemed to me indeed that my investigation would be of greater usefulness if I limit myself to anatomical observations, leaving it to the reader to bring system into them or to adjust them as much as possible to his hypotheses. Adopting none of the evolutionary theories, I hope that my descriptions are carefully made, without any prejudice.

But he concluded in affirming that he would be glad if successful in his effort to discover and describe hierarchy and natural order even in malformations. This, of course, was no longer pure description.

Analysis of S. T. Soemmerring's "Organ of the Soul"

The book can be divided into two major parts. Appealing to descriptive, developmental and comparative neurology, Soemmerring endeavored to prove in the first part that the wall of the cerebral cavities (fig. 1) receive the endings of the nerves. That the fluid contained in these cavities must be considered as the sensorium commune, is the subject of the second part.[3]

[1] See Samuel Thomas von Soemmerring's *Leben und Verkehr mit seinen Zeitgenossen*. Von Rudolph Wagner. Leipzig, Leopold Voss, 1844.

[2] *Abbildungen und Beschreibungen einiger Missgeburten, die sich ehemals auf dem anatomischen Theater zu Cassel befanden, mit zwoelf Kupfertafeln.* Mainz 1791. Kl. fol.

[3] Soemmerring knew that he was not the first one to suggest the cerebral cavities to be the seat of the soul (or the sensorium commune). But he quoted only a few names as

He denied this quality to any solid part of the brain on the ground of a fourfold reasoning:

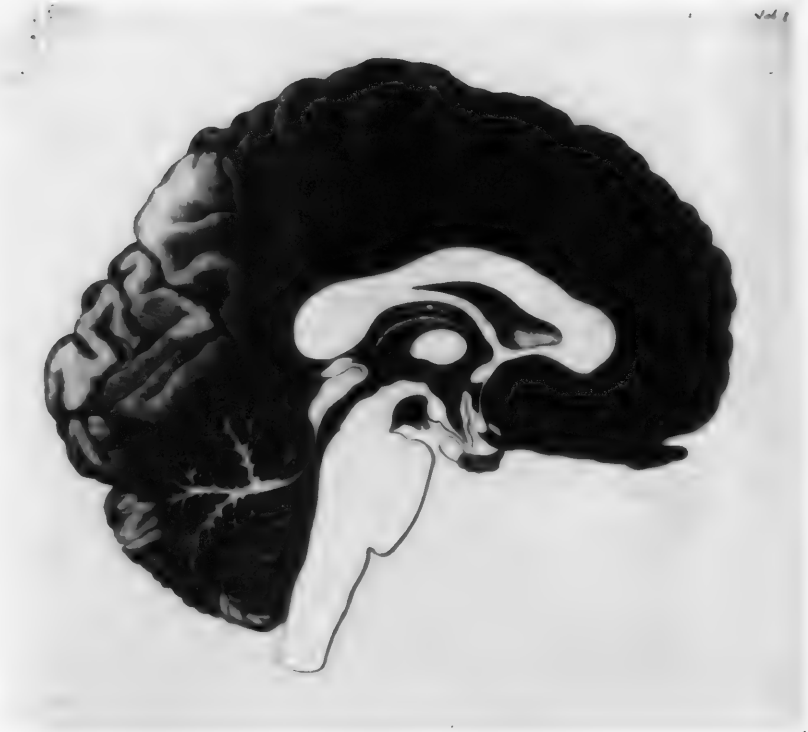
1. Movement is the most general expression of the nervous process. This movement is understood to be the same along the entire nerve. But finally it is transmitted to the fluid of the cerebral cavities and may then produce sensation, fundamentally different from the movement related to the nerve.

2. Any part of the cerebral substance can be destroyed without detectable functional disorder or impairment of the sensorium commune.[4]

3. The sensorium commune is understood to be that part of the brain where all the nerves meet. The walls of the cerebral cavities being this region, the fluid contained in the cerebral cavities is the agent by which the nerves are united (Medium uniens).

his predecessors (Herophilus, Galen, Haller's quotation of the Arabs, Arantius, Wepfer, Ith). It seems doubtful whether he was familiar with the fact that for centuries generations of physicians and philosophers believed the cerebral cavities to be the seat of the mental faculties defined and classified according to Aristotle. The story of this tradition and its individual modifications has been told by W. Sudhoff (*Die Lehre von den Hirnventrikeln in textlicher und graphischer Tradition des Altertums und Mittelalters*, Diss., Leipzig, 1913). We learn from this author that as a rule, three ventricles were distinguished. To the first "cellula" was assigned: sensus communis, vis phantastica, imaginaria, to the second: vis rationalis, intellectus, cogitatio, providentia, cognitio, to the third: motus omnis, memoria. Of these faculties only sensus and motus are allowed by a modern neurologist to have strictly defined representations in the brain and of course, in the brain substance (and not in the cavities). Sensus was believed by the medieval physicians to be related to the first (anterior), motus to the third (posterior) cavity. Again, there is but little left for an agreement between the medieval physician and the modern neurologist, the latter conceiving (since Meynert) the posterior part of the brain as sensory and its anterior part as motor in function.—The primary purpose of these remarks is to show that Soemmerring's doctrine of the cerebral cavities as "organs of the soul" was but a continuance or rather a revival of a medieval tradition. As such it includes necessarily a strong humoral-pathological element still alive among many physicians as late as in the early nineteenth century.

[4] Soemmerring here anticipated what became a century later known as the so-called negative cases of cerebral localization (C. v. Monakow, *Lokalisation im Grosshirn*, 1914). As a matter of fact he was not the first to appeal to them. In his "Traeume eines Geistersehers" Kant made the following remark: "Man hat Beispiele von Verletzungen, dadurch ein guter Teil des Gehirns verloren worden, ohne dass es dem Menschen das Leben oder die Gedanken gekostet hat." In this work Kant rejected already any local seat of the soul, thus anticipating the reasoning presented in his letter to S. T. Soemmerring, 30 years later. It is significant that Descartes who believed the pineal gland (or "conarium"), thus a solid part, to be the seat of the sensorium commune, appealed in his turn to the positive cases of cerebral localization: "on voit des blessures et maladies qui, n'offensant que le cerveau seul, empèchent généralement tous les sens, encore que le reste du corps ne laisse point pour cela d'être animé" (Edit. Adam-Tannery, VI, 109).



LEGEND

The figure is a reproduction of Soemmerring's fig. 1 (*Organ of the Soul*, 1796). It is not only for historical reasons that this figure is presented to the reader. It is indeed the first correct picture of the mesial aspect of the cerebral hemispheres, a sagittal section, showing the ventricular system and its walls, the "true profile of the human brain." But any experienced reader of our neuro-anatomical textbooks must realize that Soemmerring's figure leaves our modern reproductions far behind, as to anatomical details as well as to artistic effect. It is a master-piece of observation and reproduction. At the time of Soemmerring anatomical research was still overwhelmingly morphological (and not yet histological) and the investigator had to rely on the acuity of his observations made with naked eye. He also had to rely on an intelligent and gifted artist whom he had to instruct and to guide. Soemmerring was always anxious to secure such an assistance. In his reproductions he used a special method taught by Camper. Our modern technique of (mostly photographic) reproduction admits of the largest distribution of teaching material, and so far we are much in advance. But modern technique and mass reproduction did not come up as yet to the level of accuracy and beauty attained by our predecessors.

4. The endings of the optic and the acoustic nerves are far distant from one another, the former ending at the anterior, the latter at the posterior extremity of the cerebral cavity. Obviously to the same agent (i. e. the fluid) different processes are transmitted at different levels, the results being different sensations.

The reasons he then called forth to prove the organized or animated nature of the fluid contained in the cerebral cavities, have but little to do with natural science in the modern sense and much more with the views and language of the romantic nature philosophers; imagination was a strong element in Soemmerring's nature.[5] A most interesting and alarming problem is raised at the end of the book: If the sensorium commune is to be sought in the fluid of the cerebral cavities: what is the significance and the function of the various cerebral structures? His tentative solution is most remarkable. The "power" acting through the fluid as through its organ, needs the various cerebral structures (formed and modified by this power and by use, training and effort) in order to appeal to them as to more and more suitable instruments when needed.[6] Soemmerring even submitted that this power might be condemned to inactivity when not resisted by the cerebral structures. But he confessed this to be a "most daring assumption."

The Reaction of the Contemporaries

The effect of Soemmerring's publication was sensational. But it also provoked much criticism. It was openly rejected by others. What the

[5] What Soemmerring wrote about the comparative size of the ventricles in different species, resisted time and refined methods of investigation. But his explanation of individual and age differences in mental capacities and of some pathological conditions in the light of the amount of fluid and the degree of "humidity" of the brain, could not survive. Most remarkable is his statement that a pathologically (although not excessively) increased fluid (as in Rachitis, Hydrocephalus) might stimulate the mental faculties. He referred to head injuries, showing such an increase only when the wound was left open, but not after closure. Again, the observation was correct, but the interpretation fantastic, the cerebral cavities and the fluid they contain believed to become "liberated" or "restricted" according to open or closed defect.

Soemmerring here came very close to a law which to my knowledge has not been formulated as yet. What we call "normal" is an ideal scheme expressing an undisturbed interrelationship of the constituent (structural or functional) elements of the individual. Any deviation from this scheme, any disorder in the equilibrium of the forces at work, any lack of harmony in their interplay may lead to deficiency or to geniality (according to a whole of constellations and situations not to be discussed here). What matters in both instances, is less the (quasi regional) outgrowth of one of the qualities or faculties, than the disturbed *relation* between one element and the rest.

[6] It might not be out of place to recall that the writer conceived structures to be "facilitating and enhancing conditions of life" (see W. Riese: History and Principles of Classification of Nervous Diseases, *Bull. Hist. Med.*, 18: p. 504; 1945).

profession had to say was of minor importance when compared with the comments made by two of Soemmerring's greatest contemporaries: Goethe and Kant. The work was dedicated to Kant.

Hildebrandt [7] felt that Soemmerring's hypothesis deserved greatest attention. But so far, he continued, we failed to discover in the fluid of the ventricles any property distinguishing it from other bodily fluids contained in cavities. But he readily accepted Soemmerring's opinion that a fluid can be animate. That he meant the fluid to be the medium uniens between soul and body instead of an organ of the sensorium commune, i. e. ending of the nerves, was a startling misunderstanding. Metzger [8] also agreed in principle. The organ of the soul, he said, must be extremely delicate and easy to be put into motion ("aeusserst fein und schwingungsfaehig"). The fluid of the ventricles meets this requirement.

Goethe [9] appreciated Soemmerring's review of the literature and his observations on the subject. But he objected to the title and to the method. He would have suggested, he wrote, to call the work: On the cerebral endings of the nerves ("Von Hirnenden der Nerven"), to avoid any a priori reasoning on the fluid of the ventricles as the seat of the sensorium commune ("da man a priori nichts von den Hirnhoehlen noch ihrer Feuchtigkeit wissen kann"), to be less equivocal as to the use of the term "animate," to present the whole as a suggestion rather than as proved facts and finally to leave the soul completely out of the discussion.[10] In

[7] Letter of April 16, 1796, in R. Wagner, *l. c.*, p. 382/3.

[8] Letter of March 31, 1796, *l. c.*, p. 384/6.

[9] Letter of August 28, 1796.

[10] Goethe's dislike for the problem raised by Soemmerring's *Organ of the Soul* was mentioned by Soemmerring's biographer R. Wagner (*l. c.*). But why did Goethe avoid a subject so closely related to his anthropological interests?—Obviously, no place was left to a special soul in his all-embracing view of organized and animate nature, sole "seat" of life and soul Goethe could admit. The following fragment of Goethe's conversation with Eckermann on September 1, 1829 was brought to my attention by O. Rothbarth; it unlocks perhaps the secret of Goethe's dislike for our subject:

". . . the nature of the divinity, the immortality, the peculiarities of our own soul, and their connection with our bodies, are eternal problems, with respect to which our philosophers take us no further. A French philosopher of the most recent times begins his chapter confidently thus: 'It is acknowledged that man consists of two parts, body and soul; so we will begin with the body, and then speak of the soul.' Fichte went a little further, and extricated himself somewhat more cleverly from the dilemma, by saying 'We shall treat of man regarded as body, and of man regarded as soul.' He felt too well that a whole so closely combined could not be separated. Kant has unquestionably done the best service by drawing the limits beyond which human intellect is not able to penetrate, and leaving at rest the insoluble problems.—While the Germans are tormenting themselves with philosophical problems the English, with their great practical understanding, laugh at us and win the world."

his letter Goethe called himself and Soemmerring "empiricists" and "realists." But this qualification was obviously for polemic use since it was linked with some aggressive remarks against the "philosophers" and their "soul." To everyone familiar with Goethe's approach towards nature it is evident that Goethe neither was an "empiricist" nor a "realist," his vision of the "Urpflanze," his concept of evolution as a change according to laws never denied by organized products in spite of their ever flexible and changing forms, his idea of departmental budgets among which the formative impulse distributes its expenses,[11] being hardly compatible with empiricism in the modern sense.

Kant, using the full vigor of his critical method, immediately reduced the problem to its soluble part: in the search for the sensorium commune one has only to deal with a structure, admitting of a collective unity of all our sensations or, as he said more specifically in his letter to S. T. Soemmerring of September 17, 1795, making this unity conceivable. Giving full credit to the anatomical research of S. T. Soemmerring, he saw the sensorium commune in the fluid contained in the ventricles of the brain. He accepted this fluid to be the "immediate organ of the soul" isolating the here ending nerve fibers so as to prevent confusion of our sensations by mutual contact of the nerves; but the fluid also unites the nerves thus allowing certain sensations to be elements of the same experience ("Gemuet").—So far his discussion of the physiological part of the problem raised by S. T. Soemmerring's *Organ of the Soul*, only part admitting of solution. Kant here rejected any dealing with metaphysics and he emphatically denounced as not only impossible, but also contradictory in itself any attempt to assign a seat, i. e. a local presence to the soul (interpreted as self-consciousness). The soul cannot assign to itself any seat whatsoever since in attempting this, it would be compelled to make itself the object of its own (external) intuition and to place itself outside itself. But Kant makes also a new suggestion. The critical structure supposed to be the immediate organ of the soul must in itself be organized. What we call organization, is a quality proper to rigid structures. We understand organized matter to be an appropriate and stable arrangement of its parts. But a fluid does not meet these requirements. Therefore, to the concept of a mechanical organization, Kant here opposed that of a dynamic one [12] based on chemical principles. The hypothesis is

[11] See W. Riese: The Principle of Evolution of Nervous Function, *Jour. of Nerv. and Mental Disease, 98*: 255-266, 1943.—The Principle of Compensation of Nervous Function, *ibid., 100*: 263-274, 1944.

[12] It is to the credit of Th. H. Bast (*Annals of Med. Hist., 6*: 367-386; 1924) to have

presented that the nerves determine a decomposition of the fluid of the ventricles into its various constituent elements ("Urstoffe") according to the various sensations, each of these constituent elements when set free, accounting for a given sensation. After excitation has ceased these elements again undergo immediate recombination. Such a fluid would be permanently organizing without ever being organized. If it is true that no seat, i. e. no *local* presence [13] can be assigned to the soul, one might, however, admit of a "virtual" presence,[14] a presence through activity displayed at a region where the soul in fact does not reside.[15] In his opus

brought to the American reader the "Life and Work of Samuel Thomas von Soemmerring." But his statement that "even Kant, who was a great admirer of Soemmerring's previous work, had no word of praise for it" (i. e. the *Organ of the Soul*) is not correct and I wonder whether it was made on the ground of a careful study of the original texts. As a matter of fact, Kant called Soemmerring "the first philosophical anatomist of the visible in man" (assigning to himself the study of the invisible in man), his *Organ of the Soul* an "excellent study," a "nice discovery," due to Soemmerring's "profound anatomical researches."—Bast's statement that "Kant . . . considered it inconceivable to have the individual particles of water organized" needs also some comment. According to Kant any matter supposed to serve as the sensorium commune or the "immediate organ of the soul," must be organized. But a fluid does not meet the requirements of organized matter, the latter resisting, according to traditional views, any displacement of its parts and any modification of its structure (these requirements being met by rigid matter). Organization, Kant said more specifically in the first drafts of his letter to Soemmerring, requires a stable structure and position of the parts, irrespective of material changes. Thus, instead of a mechanical, he suggested his chemical or dynamic organization. In the light of modern biochemistry Kant's speculation is perhaps not as fantastic as it seems at first approach. That certain psychological and psychopathological conditions are related to the liberation of certain chemical substances, is a trivial statement. The fact that arrival and transmission of nervous impulses are associated with the liberation of certain chemical substances (such as Acetylcholin) fits perfectly into the general scheme of Kant's "dynamic organization."

[13] In his "Traeume eines Geistersehers" (1766) Kant had already rejected the doctrine according to which my thinking self was believed to be at a given region of my body. No experience taught him, he said, to imprison his indivisible self into a microscopic region of his brain in order to put into motion from there the level of his body machine or to be impressed thereby. He requested strong evidence before being convinced of the absurdity of what the schoolmen taught: My soul as a whole is everywhere in my body and in its entirety in each of its parts. What was here presented can best be called the doctrine of the *universal* presence of the soul.

[14] I found the same idea, namely the soul conceived as analogous with a physical force, expressed by Descartes in his answer to M. Morus of February 5, 1649. Such a force, although not being spatial in itself, can nevertheless act on spatial matter. It is highly significant that the French philosopher here used the two terms "force" and "vertu" as synonyma, the latter term leading immediately to Kant's "virtual" presence of the soul. In his correspondence with Elizabeth, Descartes used gravity as a model of the soul's action on the body.

[15] Is the admittance of an "immediate organ of the soul" still compatible with the main thesis according to which no local seat can be given to the soul? That here is

postumum Kant cited the force of attraction as a model of such a virtual presence.[16]

indeed the most critical point of Kant's reasoning is most obvious in the text of the first draft of his letter to Soemmerring of August 10, 1795. He endeavored to overcome this difficulty and to save the doctrine of the immediate organ of the soul by making a distinction between *animus* as the faculty to combine certain representations (we are entitled to relate to the brain) from *anima*, basically different from matter and a subject of metaphysics (see Kant's note no. 1 in his letter to Soemmerring of August 10, 1795).

The history of Kant's solution can be traced back to Descartes who believed the pineal gland that part of the body with which the soul is most intimately connected: "la partie du corps à laquelle elle est le plus immédiatement unie" (letter to R. P. Mersenne of July 30, 1640). Art. XXXI of the *Passions de l'Ame* contains the most concise formula of Descartes' doctrine of the seat of the soul: "Il est besoin, aussi de savoir que, bien que l'âme soit jointe à tout le corps, il y a néanmoins en lui quelque partie en laquelle elle exerce ses fonctions plus particulièrement qu'en toutes les autres." He then concludes: "Et c'est enfin la glande, où elle exerce immédiatement ses fonctions" (*l. c.*, art. XXXII).

Finally I quote another passage illustrating once more Descartes' idea of the brain as the immediate organ of the soul: ". . . le principal siège des passions, en tant qu'elles regardent le corps, est dans le coeur parceque c'est lui qui en est le plus altéré: mais leur place est dans le cerveau, en tant qu'elles affectent l'âme, parceque l'âme ne peut souffrir immédiatement que par lui . . . (A. M. Regius, Edit. Cousin, tome huitième, p. 515).

[16] The very fact that the first draft of Kant's letter is a text of 14 pages in print whereas the definite form is only 6 pages long, shows that Kant took the matter very seriously. In this draft, there is a constant search for the best formula, repetitions and modifications being frequent. The method Kant used in reasoning (always, as it were, listening to both parts involved before taking his final decision) and expressing his thought, is most conspicuous in this first draft. This method must be considered before admitting of any deviation from his critical approach or even contradictions.

What follows is an attempt to present Kant's ideas on the subject after their passage through the filter of the first draft and the definite text of his letter, the basic principles of the "critic" as a whole being the supreme instances to which to appeal in case of doubt. The "soul" being understood to be the unity of conscience, the problem raised is that of a cerebral structure compatible with or symbolizing unity. Inasmuch as unity means the "collective" unity of our sensations, the term "association" or "aggregate" is preferable, the elements of this unity (our sensations) remaining discrete, and this makes this unity but a "relative" or "comparative" one. Such a unity can indeed be symbolized by matter, always being compound, space-filling and therefore showing only collective unity. The cerebral "impression" ("Eindruck") which corresponds to our perceptions is called "habitus of reproduction." This term indicates action. Indeed, we cannot conceive these impressions ("Ideae materiales of Descartes") as copies or images, and their revivals being purely passive phaenomena. They are rather *symbols* we use in evoking our representations. Here Kant's doctrine comes very close to contemporary views. But no matter and no cerebral structure can symbolize that other unity we reach when passing from the collective unity of our representations to that unity in which these elements do no longer exist as such. It is true that each sensation is a conscious act in itself (perception). But a unity in which the elements no longer appear as such, cannot result from isolated conscious acts. The only unity of conscience, comprising all of the elements but still being unity, is self-conscience, identical in itself and always the same in the various conscious acts.

Significance Today

One hundred and fifty years have elapsed since the publication of S. T. Soemmerring's *Organ of the Soul*. The changes brought about in our subject during this relatively small interval are greater than changes many a medical thought had to undergo during centuries. Indeed, anatomical research in the 19th century set an end to the hypothetical ending of the nerves in the wall of the ventricles. Physiological studies of the cerebrospinal fluid yielded results quite different from the speculations of the great German philosopher. But one of the remaining and most precious results of the reaction provoked by Soemmerring's *Organ of the Soul* was the demarcation of the limits set to our effort to relate certain vital manifestations to the central nervous system. We learned that any such effort pre-supposes a spatial nature of the phenomena to be localized. Only those manifestations are liable to cerebral localization which (to use the language of our 18th century exchange of letters) are objects of our (external) intuition, thus spatial. Therefore, there can only be a localization of physiological processes. The fundamental error committed by the doctrine of localization of nervous function was to relate psychic qualities or faculties to distinct regions of the brain. The history of this doctrine can be written in terms of this error, from F. J. Gall to contemporary neurologists still believing some regions of the brain to be centers of the personality. Protesting voices were heard at any period of this most exciting chapter of modern medicine. Although the famous doctrine of centers of language seems to belong to the past, psychic qualities are still reconstructed by combinations, connections and associations of physiological processes and the pathways underlying them: but what resists expression in terms of space cannot be reconstructed from what is spatial.

The doctrine of the seat of the soul and its numerous variations do not constitute one of the glorious chapters in the history of human search for truth and knowledge. To almost every organ was given the privilege of being the dwelling place for the soul and this alone must arouse suspicion against the legitimacy of the doctrine. That the seat of the soul was turned over (by the Greeks) to the brain, did not mean any basic change in the futile attempt to endow one part of the body with the local residence of what comprises the whole body as an element of its content. But it is only fair to state that the denial of any local residence of the soul is as old as its assumption. It is a hopeful sign in man's struggle for truth that the birthday of any dogma is also that of its revision.

But not only the seat of the soul,[17] the soul itself belongs to the medical past, and a contemporary physiologist who would use the term soul, would probably lose his scientific reputation. When Cuvier in his report given at the meeting of the Institut de France on April 25, 1808 on the anatomical discoveries of F. J. Gall rejected any attempt to localize the individual self at a well-defined region of the divisible space, he still expressed himself in the language of his time, still being the language of humanistic thought and tradition in natural science. When he considered the interaction of the divisible matter and the indivisible self as inconceivable forever ("hiatus infranchissable dans le système de nos idées et pierre éternelle d'achoppement de toutes les philosophies"), he could rely on being understood and approved by his learned audience. At the meeting of the Paris Society of Anthropology on March 21, 1861, i. e. 53 years later, Gratiolet could still maintain a similar view, using almost identical terms: the unity of the indivisible (immaterial) self reappeared in the vocabulary of this scientist, well-known for his neuro-anatomical discoveries (the optic radiations).[18] But he now defended a lost cause. When in 1877, i. e. only 16 years later, H. Munk called mind-blindness ("Seelenblindheit") the behavior of a dog deprived of its occipital lobes, he had to apologize for using the term "mind" ("Seele"). He felt justified in his terminology by defining mind-blindness as a lack of visual representations, i. e. of the memory-images of the visual perceptions. This indeed, was the language of the new era, proud of its break with the past and with metaphysics, not realizing, however, that it just substituted one metaphysics for another. The fact that we can indicate with fair precision the moment at which the use of the term "soul" was definitely abandoned by continental neurologists, deserves greatest attention and it would certainly be a task of major interest to analyze the reasons for this decisive event.

Although it is difficult and misleading to re-translate modern medical

[17] The doctrine of the seat of the soul has no longer any significance today. The same holds true for the "sensorium commune" (or "Aistheterium") which has completely disappeared from our technical vocabulary. In using the term, Soemmerring and Kant (in the first drafts) referred to Descartes and Platner. The commentator of the first drafts quotes: Ernesti Platner: *Opuscula academica*, Berolini, 1924, p. 600.

[18] "Ne peut-on concevoir que d'une force une, indivisible et non localisée en certaines régions des hémisphères puissent résulter des actions très diverses?" "Plus, en effet, les organes seraient distincts et séparés, et plus éclatante serait, à son tour, l'unité du moi immatériel. Mais ces localisations, je ne les crois pas conformes à la nature des choses" (See W. Riese: F. J. Gall et le problème des localisations cérébrales. *L'Encéphale*, T. XXXI, No. 5, Mai 1936 (L'Hygiène mentale) and Les discussions sur le problème des localisations cérébrales dans les sociétés savantes du 18e siècle et leurs rapports avec des vues contemporaines, *L'Encéphale*, T. XXXI, No. 6, Juin 1936 (L'Hygiène mentale).

thought into that of the past, there is one principle of modern physiology which comes very close to the concept of the soul, namely the principle of integration. What distinguishes both concepts, is that integration is supposed to be active on an unconscious (physiological) level, whereas the soul was interpreted by the writers of our famous 18th century correspondence as self-consciousness. But both concepts have one major element in common, namely, their unifying character. Indeed, unity is brought into the diversity of unrelated facts only by referring them to myself as to their common and unifying element. That the integrative action is the unifying action by means of which a simple collection of isolated organs is transformed into an animal and by which is constituted an individual, was stated explicitly by Sherrington to whom we owe the introduction of the principle of integration into physiology; he borrowed it in his turn from Herbert Spencer. Henry Head made a thorough use of the principle to explain sensation as the final result of all those (grouping, re-grouping, modifying, selecting, sorting, inhibiting, rejecting) processes succeeding the always massive impact of impressions to which an organism is exposed at any moment. At first approach the unifying nature of integration seems less obvious in the interpretation given to the principle by H. Head. He understood integration to be a reaction of the organism to form a fresh pattern of afferent impulses (*Aphasia*, I, p. 504). But this reaction was meant to be a purposeful one, its close regulation according to the needs of the moment and its harmony with the reaction of the organism as a whole (*l. c.*, p. 425) being the final goal. The British school of neurophysiologists has always been teleological. But there is no purposeful, thus no integrative action which would not pre-suppose unity in plan and action.

As a rule contemporary physiologists consider the central nervous system as the agent responsible for integration. And here is the critical point of the principle. If integration is understood to be true unity, i. e. more than association, or to use the language spoken by one of Soemmerring's correspondents (Kant), " collective unity," it cannot be left to any organ selectively, each organ being submitted to integration, no single organ being able in itself to bring about unity of the whole. We rather have to conceive integration as inherent to organized matter as such [19]

[19] The concept of the " Horme " conceived by another contemporary neurologist, C. v. Monakow, meets this requirement. It is understood to be the expression of the " vital program " active at all levels of the growing and finished organism. It is also understood to be in indissoluble union with the protoplasm, thus with organized matter as such. This distinguishes the Horme from all those vitalistic concepts (not discussed here)

All of the parts have their shares in bringing about unity of action [20] and the presence of the integrating factor must be conceived as a universal and not as a local one. The nature of this universal presence is unknown, the model of a virtual presence (through acting and not through residing) still being the most plausible one. This is another witness of the significance Soemmerring's work and its reaction may have for our generation.

placing vital forces of different kind outside the organism. The text of the first drafts of Kant's letter to Soemmerring did not distinguish between "soul" and "vital principle," to which Kant was even inclined to give the term "irritability." The laws according to which the constituent elements of the fluid of the cerebral cavities were decomposed and re-combined were designated as "vital laws" (Vitalitaetsgesetze"). Kant left it even open whether the fluid is not only the immediate organ of the facultas locomotiva and the facultas representativa, but also that of the vital power itself. C. v. Monakow, although admitting of the Horme as of an organogenic agent, was anxious to stay within organized nature itself and not to invade metaphysics. The morphological and physiological manifestations of the Horme are different according to developmental stages each of which being due to the activity of corresponding stages of the Horme (called "Hormeterien" at a primitive, Noohormeterien at a higher level). The specifically human activities and tendencies are believed to be the final result of this developmental process. Self-consciousness is but a "reflection" of the Horme at the highest level. This doctrine brings into discussion all the difficulties implied in the various attempts to derive what is best known to man, i. e. his conscious thought and action, from what is less or even unknown to him, i. e. the unconscious or so-called vital sphere, instead of interpreting the latter in the light of the former.

[20] We interpret integration as analogous with a purposeful *action*. Thus, we not only do justice to Sherrington's original concept, but we join also the doctrine of a "virtual" presence (through activity but not through local residence) of the unifying factor. At the same time we obtain a precise definition of the principle itself. Indeed, integration, bringing about the unity of the organism, cannot be supposed to reflect a permanent *state*. As a state, it would be determined in its turn, states appearing and disappearing according to conditions. But by its very nature integration means a principle interfering with states and regulating them. As an action, integration gains the character of actuality; in other words it exists and lasts only as long as the integrative principle is active. The unity of the organism is achieved irrespective of the most variable (morphological and physiological) conditions. In calling "life" the whole of these conditions, i. e. the ever changing material to be integrated, life is indeed unique, irrevocable and not open to repetition. In giving the name "life" to the integrative principle, life is identical in itself. The latter cannot be defined more precisely and we adopt it as a necessarily and deliberately empty concept. Nor can a more precise definition be given of an individual's faculty to act according to purpose, this faculty being the model of integration. An analysis of this faculty, its deriving from other causes, is impossible. We adopt it as a basic power we have to pre-suppose (but not to derive) when studying the manifestations of an acting individual. Similarly, we pre-suppose integration (interpreted as life) when studying the vital manifestations of an organism. Therefore, the principle of integration cannot be derived from organs and functions sources of the material to be integrated. (See W. Riese: The Principle of Integration, Its History and Its Nature, *J. Nerv. and Ment. Dis.*, *96*: 296-312, 1942).

MATERIALISM IN FRENCH AND GERMAN PHYSIOLOGY OF THE EARLY NINETEENTH CENTURY

OWSEI TEMKIN

Around 1800 French physiologists elaborated a doctrine which stood in contrast to the beliefs of their great countryman, the philosopher Descartes. Descartes had clearly separated man's body and soul, the body was a mere mechanical machine, bare of sensation, thought and will which belonged to the soul as a spiritual entity. Yet for Cabanis, Bichat, Richerand, and many others including the young Magendie, the body could not be understood as a mere machine. Whether vital properties were believed to counteract the physical and chemical processes or whether a vital force was assumed to cover our ignorance regarding nutrition and so-called vital actions, the result was the same in so far as the laws of inanimate nature were declared insufficient to explain all the manifestations of life. But if the body was thus given autonomy, the soul on the other hand was deprived of the position Descartes had assigned to it. Passions, instincts, thought and will could be studied as phenomena dependent upon our external and internal sensations and, therefore, upon our biological organization.

In an article dealing with the philosophical background of Magendie's physiology,[1] I have tried to show in more detail how this attitude was rooted in the sensualistic philosophy which had been developed by Locke and Condillac and had been brought to a radical formulation by the so-called idéologues during the French revolution. "Feeling" and "sensibility" most clearly manifested in animals became the central phenomenon for an explanation of nature as well as the mind. Cabanis, the physiologist among the idéologues, even went as far as to suggest that gravitation and chemical affinity might be primordial forms of sensibility.[2] Obviously such an attitude was a favorable ground for a vitalistic biology. On the other hand, the mental activities of man too were reduced to sensibility, whereby man was put on a par with animals. It was this elimination of an independent spiritual principle that was decried as materialism. It mattered little whether physiologists as, for instance, Bichat retained a belief in

[1] O. Temkin, The philosophical background of Magendie's physiology, *Bull. Hist. Med.*, vol. 20, pp. 10-35, 1946.

[2] Cf. *ibid.*, p. 20.

the soul, if only the soul could be neglected in physiological research and as long as psychology was a mere province of physiology.

I think that we find an echo of this " vitalistic materialism " in Balzac who has been credited with the intention of presenting the physiology of contemporary French society in his cycle of novels.[3] In " La peau de chagrin " he describes a wild orgy where the participants, drunk with wine, exhibit their lowest passions. " The resemblances to animals inscribed upon the human features and so curiously demonstrated by the physiologist reappeared vaguely in the gestures and the attitudes of the body. Here was a book ready written for some Bichat, if he had been present, cool and sober."

Balzac sees the animal in man and to him passions rather than abstract material forces are the elements which decide man's actions. Passions and instincts were considered deeply rooted in man's biological organization by many physiologists of the time: " Great poets, heroes, great criminals and conquerors are empassioned men," Magendie wrote in 1816 in his textbook of physiology.[4]

Some peculiarities of this vitalistic materialism stand out in better relief if we now compare it with the materialism of the German physiologists.[5] During the early decades of the last century when the idealistic systems of Fichte, Schelling and Hegel dominated, the few German physiologists who, like Ernst Heinrich Weber, kept aloof from the romantic " Naturphilosophie "[6] were little given to any philosophizing at all. Paradoxically enough, the German physiologists began to exert a philosophical influence upon popular thought most strongly after they had broken away from the

[3] W. Dilthey, Die drei Epochen der modernen Ästhetik und ihre heutige Aufgabe, in: *Gesammelte Schriften*, 6. Band, Leipzig-Berlin, Teubner, 1924, p. 244: " Balzac wollte methodisch in einem zusammenhängenden Zyklus von Romanen die Physiologie der damaligen französischen Gesellschaft geben: der Zusammenhang der menschlichen Leidenschaften mit dem sozialen Boden, auf dem sie wachsen, und die pathologische Bedingtheit der Personen, in denen diese Leidenschaften entstehen, beschäftigen ihn vornehmlich." I am indebted to Dr. L. Edelstein for this reference. Cf. also P. Lamy, *L'introduction à l'étude de la médecine expérimentale, Claude Bernard, le naturalisme et le positivisme*, Paris, 1928, p. 8 f and E. Cailliet, *La tradition littéraire des idéologues*, Philadelphia, The American Philosophical Society, 1943, p. 152 f.

[4] F. Magendie, *An elementary summary of physiology*. Translated from the French by J. S. Forsyth, London, 1825, I, p. 125. Cf. also Temkin, *op. cit.*, p. 16.

[5] For this and the following cf. J. T. Merz, *A history of European thought in the nineteenth century*, vol. 2, third ed., Edinburgh and London, 1928; F. A. Lange, *Geschichte des Materialismus*, 2. Aufl., II, Iserlohn, 1875; E. Rádl, *Geschichte der biologischen Theorien seit dem Ende des siebzehnten Jahrhunderts*, 2 vols., Leipzig, 1905-1909, especially II, pp. 80-84.

[6] Cf. C. Ludwig, *Rede zum Gedächtniss an Ernst Heinrich Weber*, Leipzig, 1878, p. 6 f.

philosophy of nature. This event can be placed in the late 30's, about 10 years before the revolution of 1848. It cannot be doubted that, as Dr. Ackerknecht has shown,[7] this materialistic bias of the medical men was related to the revolutionary movement of '48. And it was just because of its political significance that the materialistic tendency was most noticeable where it was directed against the belief in man's spiritual character. In France as well as in Germany a denial of the soul could be used as a denial of theological claims and of the rule by divine right of kings. In 1846 Carl Vogt wrote: "I think that every scientist if thinking at all consistently will reach the opinion that all the faculties which we comprise under the name of psychic actions are nothing but functions of the cerebral substance, or, to express myself somewhat crudely, that thoughts have about the same relation to the brain as bile has to the liver or urine to the kidney."[8] These words which scandalized the world were not much more than a repetition of a similar thought expressed by Cabanis almost half a century before.[9]

And yet, German materialism as it developed among physiologists from 1838 on showed a different pattern from its French predecessor. To be sure, not all French physiologists had been vitalists. One has but to mention Dutrochet who coined the terms of endosmosis and exosmosis in order to realize that mechanistic doctrines were by no means lacking in French physiology.[10] But it seems fair to say that in Germany such attempts were overshadowed by a veritable campaign against the assumption of a vital force, a campaign where the first shot was fired by Theodor Schwann in 1839 in the same work that contained his interpretation of the cellular origin of the animal organism.[11] Neither Schwann nor Schleiden whose names are so intimately connected were materialists.[12] Schwann was a very religious person and Schleiden in 1863 published one of the most violent attacks against the materialism in modern German science.[13] But

[7] E. H. Ackerknecht, Beiträge zur Geschichte der Medizinalreform von 1848, *Sudhoffs Arch. Gesch. Med.*, vol. 25, 1932, pp. 61-109 and 113-183; cf. p. 86 f.

[8] Carl Vogt, *Physiologische Briefe für Gebildete aller Stände*. Stuttgart and Tübingen, 1845-1847, p. 206.

[9] Cf. Temkin, *op. cit.*, p. 14.

[10] Cf. A. R. Rich, The place of R.-J.-H. Dutrochet in the development of the cell theory, *Bull. Johns Hopkins Hospital*, vol. 39, 1926, pp. 330-365. Cf. also below p, 326.

[11] Th. Schwann, *Mikroskopische Untersuchungen über die Übereinstimmung in der Struktur und dem Wachstume der Tiere und Pflanzen*. Hrsg. von F. Hünseler, Leipzig, 1910 [Ostwald's Klassiker der exakten Wissenschaften, Nr. 176].

[12] Cf. Rádl, *op. cit.*, II, pp. 65-73.

[13] M. J. Schleiden, *Ueber den Materialismus der neueren deutschen Naturwissenschaft*, Leipzig, 1863.

they attacked vitalism, and Schwann in particular presented the problem as an alternative between the following views: either the organism is endowed with a force which forms it as a whole according to some idea, or the organism is subject to forces which act according to blind necessity, forces which are inherent in matter itself. Schwann decided for the latter alternative. But how to account for the purposefulness of organic structure? Schwann did not deny purposefulness, but he transferred it from biology to the world as a whole, and from a vital force to the Creator. God had created matter and its forces, so that by following their blind laws they nevertheless produced a purposeful whole. Only in degree were organisms more purposeful than, for instance, the planetary system.[14]

Schwann's whole argument against purpose in biology is not without interest. Many physiologists before Schwann had denounced final causes only to use a downright teleological language in large sections of their works.[15] Where vitalism prevails, teleology is easily excused. But for the antivitalist the problem is a very difficult one, and was especially difficult in the days before Darwin. Schwann's solution of shifting the problem from biology to the world as a whole served as a model for many materialists during the following decade. Lotze's famous article on life and vital force which appeared in 1842 [16] attacked the assumption of a specific living matter as distinguished from inorganic matter and the unclear use of the concept of force by the vitalists. But in discussing the purposefulness of the organism Lotze used an argument very similar to that of Schwann. Vogt too, materialist that he was, nevertheless spoke rather naively about the plans of nature and of the Creator.[17] Even Du Bois-Reymond tried to argue away inconvenient biological teleology by

[14] Schwann, *op. cit.*, p. 183 ff. However, Schwann admitted that in man as a free being, a principle substantially different from matter had to be recognized; cf. *ibid.*, and E. Du Bois-Reymond, *Reden*, 2. Aflg., hrsg. von Estelle Du Bois-Reymond, 2 vols., Leipzig, 1912, vol. 1, p. 289. The admission of Schwann's put him in basic agreement with Descartes (cf. Du Bois-Reymond, *op. cit.*, II, p. 497), so that antivitalism once again started where it had set out in the 17th century. It may be mentioned that of contemporary physiologists Flourens too has been considered a Cartesian, although in his youth he had been a friend of the idéologue Destutt de Tracy. Cf. *Nouvelle biographie générale*, Paris, Didot, t. 18, 1857, cols. 11-14; A. Schopenhauer, *Die Welt als Wille und Vorstellung*, 2. Band, Leipzig, 1919, p. 328 ff. [Sämtliche Werke, hrsg. Otto Weiss]; F. Picavet, *Les idéologues*, Paris, 1891, p. 434.

[15] Cf. E. Nordenskiöld, *The history of biology*, New York, 1942, p. 327 for Lamarck. Similar contradictions occur in Cabanis and many other physiologists down to our own days; cf. C. Singer, *A short history of biology*, Oxford, 1931, p. 213 f.

[16] H. Lotze, Leben, Lebenskraft; in Wagner's *Handwörterbuch der Physiologie*, I. Braunschweig, 1842, pp. ix-lviii.

[17] Vogt, *op. cit.*, pp. 3 f., 50, 62 *et passim*.

referring to the apparent purposefulness of many other cosmic phenomena.[18] However, there was this difference, that Du Bois-Reymond merely played with an idea which for Schwann had been a serious conviction. Since the mechanistic doctrine had to prevail and organization could not be explained, it was simply ridiculed out of the discussion.

With Du Bois-Reymond we reach one of those German physiologists who did most to prepare the ground for mechanistic materialism. In 1841 he is yet torn between opposing sentiments, yet he quotes with approval Dutrochet's opinion: "The more one advances in the knowledge of physiology, the more reasons one will have for stopping to believe that the phenomena of life are essentially different from the physical phenomena." [19] By 1842 he and Brücke have sworn to fight for the truth that all forces active in the organism must be reducible to attractive and repulsive components.[20] Towards the end of 1845 he announces his acquaintance with Helmholtz and writes: "In addition to Brücke and my own humble self this is . . . the third organic physicist of the alliance." [21] A fourth ally in the fight for a mechanistic physiology was found in Carl Ludwig. The program of the new school was formulated in the preface of Du Bois-Reymond's "Investigations Concerning Animal Electricity" of 1848 where the author predicted the day when physiology would dissolve completely into biophysics and biochemistry.[22] Analytical mechanics was the ideal science in whose terms all natural events should be described if possible. This aim at physical exactness and mathematical interpretation on the part of leading German physiologists contrasted with the methods and views of the most outstanding French physiologists. Bichat, Legallois, Magendie and even Flourens and Claude Bernard did their most important experiments on living animals where vital phenomena could be studied as such. For the older of these men, at least, this was a consequence of their vitalistic background.[23] Although Magendie insisted

[18] Du Bois-Reymond, *op. cit.*, I, p. 20 f. This passage originally occurred in the preface to Du Bois-Reymond's *Untersuchungen über thierische Elektricität*, 1. Band, Berlin, 1848, pp. v-lvi, a large part of which was republished in the *Reden* under the title "Über die Lebenskraft."

[19] *Jugendbriefe von Emil Du Bois-Reymond an Eduard Hallmann*, hrsg. von Estelle Du Bois-Reymond, Berlin, 1918, p. 98.

[20] *Ibid.*, p. 108.

[21] *Ibid.*, p. 122 f.

[22] Du Bois-Reymond, *Reden*, I, p. 21 (cf. above footnote 18).

[23] In spite of his insistence on determinism in biology, Claude Bernard did not believe in a purely mechanistic explanation of life. In his *Leçons sur les phénomènes de la vie*, t. 1, Paris, 1878, he wrote (p. 50 f.): "Les phénomènes vitaux ont bien leurs conditions physico-chimiques rigoureusement déterminées; mais en même temps ils se subordonnent

that physics and chemistry be given a suitable province in physiology, he did not insist on mathematical treatment.[24] Helmholtz and Du Bois-Reymond, on the other hand, were physicists in the realm of organic nature. It was characteristic for the former that his work on the preservation of energy was closely connected with the attempt at disproving any special vital force.[25] It was characteristic for the latter that as late as 1857, i. e., 9 years after the first volume of his " Investigations Concerning Animal Electricity " had been published, he had to ask Ludwig's help in mastering the art of vivisection.[26]

But in the preface to this work Du Bois-Reymond went further than pleading for a mechanistic concept of man's body. He believed that if the analytical mechanics of vital processes could only be pushed far enough, then, in principle at least, it would even reach the problem of personal freedom.[27] This statement he later on revoked and admitted that consciousness could not be explained mechanically.[28] Nevertheless, the statement shows that by 1848 some German physiologists had advanced to a position that recognized only matter and force. Its essence was characterized in the formula in which the philosopher Feuerbach summarized Moleschott's popular text on food: " Der Mensch ist, was er isst " [29]—man is what he eats. To the vitalistic materialists in France man was but an animal. To the mechanistic materialists in Germany he became but a passing constellation of lifeless particles of matter.

et se succèdent dans un enchainement et suivant une loi fixés d'avance: ils se répètent éternellement, avec ordre, régularité, constance, et s'harmonisent, en vu d'un résultat qui est l'organisation et l'accroissement de l'individu, animal ou végétal." For the latter phenomenon he admits the term of " force vitale " and says metaphorically (p. 51): " la force vitale dirige des phénomènes qu'elle ne produit pas; les agents physiques produisent des phénomènes qu'ils ne dirigent pas." But the vital force is never directly accessible to the physiologist.

[24] Cf. Temkin, *op. cit.*, p. 29, note 106.

[25] Cf. L. Koenigsberger, *Hermann von Helmholtz*, 1. Bd. Braunschweig, 1902, pp. 58 ff. 81 ff. and 92.

[26] Estelle Du Bois-Reymond [ed.], *Zwei grosse Naturforscher des 19. Jahrhunderts. Ein Briefwechsel zwischen Emil Du Bois-Reymond und Karl Ludwig*. Leipzig, 1927, p. 146 f.

[27] Du Bois-Reymond, *Reden*, I, p. 9.

[28] *Ibid.*, p. 23.

[29] J. Moleschott, *Für meine Freunde*, Giessen, 1894, p. 208.

THE PHILOSOPHY OF IDEOLOGY
AND THE
EMERGENCE OF MODERN MEDICINE IN FRANCE

GEORGE ROSEN

I

Introduction

In considering the emergence of modern medicine in France, that is, the rise and development of the Paris school of the first half of the nineteenth century, medical historians generally have centered their attention upon personalities, advances in knowledge, and innovations of theory or technique. At the same time, they have either given but scant attention or ignored completely the philosophical underpinning of this development. More specifically, they have tended to ignore the philosophy known as Ideology, which achieved its most characteristic expression during the French Revolution, and the theoretical and practical relations of this philosophy to the rebirth and development of French medicine at the end of the eighteenth century and during the early years of the nineteenth century. Thus, while there are passing references in histories of medicine to Condillac, and to his successor Cabanis, who together with Destutt de Tracy developed Condillac's sensationalism into the distinctive ideological philosophy, there has been no awareness on the part of medical historians that Ideology might be a significant interpretative factor in the study of French medicine during the Revolutionary and post-Revolutionary periods.[1]

[1] Although he does not mention *Ideology* by name, Sudhoff among modern medical historians, came closest to recognizing the rôle of this philosophy in the development of modern medicine. In his *Kurzes Handbuch der Geschichte der Medizin* (Berlin, 1922), he stated (p. 333): "Barthez steht unter der Einwirkung des Sensualismus Condillacs (1715-1780), der die Zerlegung der Wahrnehmung in ihre Elemente und nachherige Synthese als Methode der Wissenschaft wies und samt dem mehr materialistisch gerichteten Cabanis (1757-1808) die Französische Physiologie und Psychologie dieser Zeit massgebend beeinflusste." And again (p. 334) speaking of Pinel, he says: "In der wichtigen Schrift Nosographie philosophique ou la méthode de l'analyse appliquée à la médecine (Paris 1789) 2 Bände, sprach er mit der grössten Bestimmtheit den hier zum ersten Male klar und präzis betonten Gedanken von der 'Analytischen Methode' (Condillac) als massgebend auch für die pathologische Forschung aus und wurde damit der Vorläufer des berühmten Bichat." Referring to the latter (p. 351), Sudhoff remarks

The purpose of the present investigation is to show that the philosophy of Ideology, and the proponents of this philosophy, the Ideologues, exerted a significant influence on the development of medicine in France. To do this three questions will be examined. What is Ideology? What contribution to medical theory developed from the doctrines characteristic of Ideologic thought? What rôle in the rebirth and development of medicine during and after the French Revolution was played by the Ideologues?

II.

What is Ideology?

The term Ideologues (*Idéologues*) is commonly applied to a group of French thinkers of the revolutionary and post-revolutionary period who developed and systematized the ideas outlined by the Abbé Etienne de

that "Bichat, teilweise auf spekulativem Wege vorgehend, von dem Vitalismus, wie er in der Hallerschen Irritabilitäts- und Sensibilitätslehre sich ihn auszusprechen schien, unter Vermählung mit der analytischen Philosophie eines Condillac und Cabanis zur Grundlegung einer neuen Heilwissenschaft suchte. . . ."

Other historians have less to say on these points, make no mention of *Ideology*, and indicate only slightly, if at all, any connection between the advocates of this philosophy and medicine. Garrison (*History of Medicine*, 4th Ed., 1929, p. 399) mentions only that medical history was taught at the Paris Faculty by Cabanis from 1799 to 1808. In *The Great Doctors, a Biographical History of Medicine* (New York, 1933), Sigerist says (p. 277) that Pinel "subsequently transferred to the study of philosophy upon which topic his doctrines were akin to those of the sensualists, the followers of Condillac." Again on page 279 attention is called to the nosographic views and the psychology of Condillac. Cabanis is not mentioned. Castiglioni in his *History of Medicine* (New York, 1941) has this to say (p. 634) about Pinel, that following the views of Condillac, he affirmed the necessity of the analytic method in the study of medicine. Concerning Cabanis he states (p. 752) that among the medical historians at the beginning of the nineteenth century was Cabanis, who in 1804 published a short study on *Les Révolutions et la réforme de la médecine*. Shryock has two references to Cabanis and his book *Du degré de certitude de la médecine* in his *Development of Modern Medicine* (Philadelphia, 1936), pp. 23, 51. On page 151, Shryock states that ". . . it became Napoleon's policy to encourage physicians, and their labors, in contrast to the earlier republican distrust of scientific leadership," and goes on to say that this factor was in part responsible for "the fact that, after about 1795, a group of young medical men appeared who were more critical and more objective in their work than any of their local predecessors." Among these he mentions Pinel and Bichat, and calls attention to the Société médicale d'émulation which the latter helped to organize. As will be shown later in this paper, Shryock overlooks completely the actions taken between 1794 and 1800 by men, who professed the Ideologic philosophy, or who were influenced by it, and which prepared the way for the emergence of modern medicine in France. Finally, attention may be called to the remarks of Zilboorg on Cabanis. This author in his *History of Medical Psychology* (New York, 1941) points out the connection between Cabanis and Pinel, although he erroneously denies that *Cabanis was a physician* (p. 283).

Condillac during the mid-eighteenth century into the formal philosophy of Ideology.[2] The treatises of Condillac contain the basic method and principal interests of Ideology, and the Ideologues looked upon him as the founder of their school. In the words of Destutt de Tracy, Condillac " really created Ideology." Although he died in 1780, so that a generation or more separated him from the Ideologues, the connection between Condillac and the Ideologic school is clear. The political, social, and moral applications of Condillac's philosophy were developed during the latter half of the eighteenth century by Helvétius, Condorcet and others. Not until the last decade of the century, however, was any advance made in developing the formal philosophy of Ideology. (In fact, it was not until 1802, just when the school was about to be suppressed by Napoleon, that the term *Idéologie* made its appearance.) During the 1790s and the early years of the nineteenth century, the tenets of this philosophy were formally systematized in the writings of Cabanis and Destutt de Tracy. It was Cabanis, in particular, who provided the physiological data required to substantiate and to correct Condillac's sensationalism.

The link between Condillac and the Ideologues of the Revolution was the salon of Madame Helvétius. At the end of the eighteenth century, the home of the widow Helvétius at Auteuil provided a meeting place for a select circle of intellectuals which included such distinguished men as Condorcet, D'Alembert, and Lavoisier. In 1778, the youthful Cabanis was presented to Madame Helvétius, who adopted him as her son and heir. Upon her death in 1800, the estate at Auteuil passed to Cabanis; and there the Ideologues retired after Napoleon suppressed their stronghold,

[2] The account of the Ideologic school is based on the following sources: P. J. G. Cabanis: *Rapports du physique et du moral de l'homme*, 2 vols., 3rd edition, Paris, 1815.—A. L. C. Destutt-Tracy: *Elemens d'idéologie. Première partie. Idéologie proprement dite*, 2nd edition, Paris, 1804.—Karl Marx and Friedrich Engels: *Die Heilige Familie*, Aus dem literarischen Nachlass von Karl Marx, Friedrich Engels und Ferdinand Lassalle, herausgegeben von Franz Mehring (Zweiter Band), Stuttgart, 1902, pp. 65-324 (especially pp. 231-242).—François Picavet: *Les Idéologues. Essai sur l'histoire des idées et des théories scientifiques, philosophiques, religieuses, etc. en France depuis 1789*, Paris, Felix Alcan, 1891.—Antoine Guillois: *Le salon de Madame Helvétius, Cabanis et les Idéologues*, Paris, Calmann Levy Editeur, 1894.—Paul Triaire: *Récamier et ses contemporains 1774-1852. Etude d'histoire de la médecine aux XVIII^e et XIX^e siècle*, Paris, 1899.—George Boas: *French Philosophies of the Romantic Period*, Baltimore, Johns Hopkins Press, 1925.—Gottfried Salomon: Historischer Materialismus und Ideologienlehre, *Jahrbuch für Soziologie* II: 386-423, 1926.—Charles Hunter Van Duzer: *Contribution of the Ideologues to French Revolutionary Thought*, Baltimore, Johns Hopkins Press, 1935.—Emile Cailliet: *La tradition littéraire des idéologues*, Philadelphia, The American Philosophical Society, 1943.

the Second Class of the Institut National. In this cultivated and mundane milieu were discussed and elaborated the theories of ideology.

The point of departure of the Ideologic philosophy is the theory of knowledge advanced by Etienne de Condillac. This interpretation of knowledge is based on two premises, first, that sensations are the primary data of cognition, and secondly, that all ideas and all the faculties of human understanding, e. g. perception, judgment, and memory, are compounds of sensations that may be resolved by analysis into their component elements. Nothing is present in the mind which has not entered it through sense-channels. The basis of the " formation et génération des idées " is experience, and experience is given immediately in sensation. " Penser c'est toujours sentir." Ideas are simply representations of things (objects), for reality, which is what is actively effective, lies outside ourselves. Consequently, to establish the validity of an idea it is necessary to subject it to a process of analysis, that is, to break it down into its component sensations, and to trace each of these back to its source in nature or society. In this way the operations of the mind could be studied, and the human understanding refashioned into a precise instrument for the attainment of truth.

The union of this passive psychology with empiricism is the special characteristic of Ideology. While this philosophy of the Revolution obviously stemmed from Condillac, its proponents did not accept all the details of his system. According to Destutt de Tracy, the Ideologues merely adopted their master's method. " C'est de la méthode et non des décisions de Condillac que nous faisons grand cas." " This method," asserts de Tracy, " shows us why we cannot construct systems. . . . It consists in observing facts with the greatest care, in inferring from them only the most certain conclusions, in never giving to simple hypotheses the stability of facts, in undertaking not to write truths unless they are naturally linked together without gaps, in admitting frankly what one does not know, and constantly preferring absolute ignorance to every assertion which is merely probable." [8]

This method of radical empiricism was to serve as a guide in all phases of human thought and activity. Not only would it increase and deepen man's knowledge of his nature, but it would also orient him to the chang-

[8] Destutt de Tracy: *Elemens d'idéologie, Première partie. Idéologie proprement dite.* 2nd Edition, Paris, An XIII, 1804, p. xvi; Idem: *De la métaphysique de Kant*, Mem. de l'Institut: Sci. Mor. et Pol., IV, p. 549; Idem: *Sur la faculté de penser, ibid.*, I, p. 302. See also Picavet: *Les Idéologues* etc., p. 22.

ing aspects of his social environment.[6] It is in the light of these teachings that one must consider the program of reform and reconstruction in medical education which was initiated and carried out in France during the years between the Thermidorian reaction and the rise of Napoleon.

III.

Ideology and Medical Theory

Within the limits of this brief paper, it is manifestly impossible to present an extensive and detailed account of the influence of Ideology on medical thought. Instead, attention will be called to several aspects of this subject. We may begin with Philippe Pinel's application of the Ideologic concept of *analysis*[5] to the study of medicine.

Pinel was closely associated with the brilliant circle at Auteuil, to which he had been introduced by Cabanis and Roussel.[6] The closeness of his attachment is shown by the fact that he helped Cabanis to find a hiding-place for Condorcet when the latter was being hunted by the police.[7] As a result of this association, Pinel came under the influence of Ideology, and undertook to reconstruct medical theory by applying to it the analytic method.[8] The product of this effort was Pinel's major work, *Nosographie philosophique ou méthode de l'analyse appliquée a la médecine,* which appeared in 1798. It was well received and went through six editions in twenty years.[9] Among his contemporaries his reputation was based in large measure on the fact that he was "the first, who by applying analysis to the study of diseases classified them, and who by this method discredited all hypotheses."[10]

[4] According to Cabanis: "Depuis Locke, Helvétius, et Condillac, la métaphysique n'est que la connaissance des procédés de l'esprit humain, l'énoncé des règles que l'homme doit suivre dans la recherche de la vérité, soit que cette recherche porte sur nous-mêmes, soit qu'elle ait pour objet les êtres ou les corps extérieurs avec lesquels nous pouvons avoir des rapports. Elle s'applique également aux Science physiques, aux Sciences morales, et aux Arts; on peut en développer les principles et les appuyer, d'examples, dans le laboratoire d'un chimiste, ou même dans l'atelier du plus simple artisan, comme dans la seconde de l'Institut ou dans les écoles de Logique, de Grammaire et de Législation." Cited by Van Duzer, *op. cit.*, p. 43.

[5] In Ideologic usage, the concept of *analysis* includes both analysis, in the ordinary sense, and synthesis.

[6] A. Pariset: *Histoire des membres de l'académie royale de médecine, ou recueil des éloges lus dans les séances publiques*, Paris, 1850, vol. I, p. 215; René Semelaigne: *Aliénistes et Philanthropes*, Paris, G. Steinheil, 1912, p. 21; Triaire, *op. cit.*, p. 110.

[7] Guillois, *op. cit.*, p. 83.

[8] Triaire, *op. cit.*, p. 110; Semelaigne, *op. cit.*, p. 27; Picavet, *op. cit.*, p. 172.

[9] Sigerist, *Grosse Aerzte*, p. 205.

[10] J. G. A. Lugol: *Discours sur la système naturel des idées, appliquée a l'enseignement*

For Pinel, *analysis* was a universally applicable scientific methodology, an instrument for testing the validity of hypotheses and discovering truth. In replying to the question " Is analysis applicable to medicine? " he points out that this is the same as asking whether " medicine employs the method commonly used in all other branches of natural history. . . ." [11] In accordance with Ideologic philosophy, Pinel taught that concepts based on phenomenological data are inadequate for a proper understanding of disease. The validity of such ideas must be established by analysing the phenomena observed clinically and tracing these back to their sources in the organs. Within an organ, it is necessary to determine the changes that take place in the various elements of which it is composed.

Here obviously is a program requiring empirical substantiation, but with Pinel it remained only a rather vague formulation. Nevertheless, the inpulsion provided by Pinel's use of the analysis concept led to a more precise formulation and substantiation of his ideas.

This was the accomplishment of Xavier Bichat. Stimulated by his reading of Pinel's *Nosographie philosophique*, he conceived the important concept, which he proceeded to develop in his *Traité des membranes*, that organs are composed of simpler tissues, and that the morbid change which a specific tissue undergoes is the same no matter in what organ it is situated.[12] " The more we examine bodies," he stated, " the more we must be convinced of the necessity of considering local disease not from the standpoint of the compound organs, which are rarely affected as a whole, but from the standpoint of their different textures, which are almost always attacked separately."

Although Bichat does not refer to any medical exponents of Ideology, other than Pinel, as having influenced his ideas, yet as Picavet suggested it is possible that he was affected more profoundly than he wished to acknowledge by the work of Cabanis. According to Picavet, Bichat's silence with regard to Cabanis may be explained by the political differences which existed between them.[13]

de la médecine, prononcé le 16 novembre 1814 à l'ouverture d'un cours de médecine, cited by Picavet, *op. cit.*, p. 434, footnote 6.

[11] Pinel: " Analyse appliquée a la médecine," *Dictionnaire des sciences médicales* . . . , Paris, 1812, vol. 2, p. 25.

[12] Xav. Bichat: *Traité des membranes en général et de diverses membranes en particulier*, Paris, An VIII [1800], p. 3. " Le cit. Pinel a établi, d'après ces principes, un judicieux rapprochement entre la structure différente et les différentes affections des membranes: c'est en lisant son ouvrage, que l'idée de celui-ci c'est présentée a moi . . ."

[13] Picavet, *op. cit.*, pp. 434, 436;—Cabanis, *Rapports*, vol. II, Preface p. xvii.

Among the contributions of Ideology to medicine, the work of Cabanis occupies an important and prominent place. Indeed, Friedrich Lange in his *Geschichte des Materialismus* has even gone so far as to call him the "*father of materialistic physiology.*" [14] While we need not go so far as Lange, the contribution of Cabanis does entitle him to be regarded as one of the founders of physiological psychology.

As previously indicated, the Ideologues attempted to study ideas and mental faculties by means of the scientific methodology which they called the analytic method. Cabanis pointed out that this study must be based on a knowledge of the physical nature of man; and in his *Rapports du physique et du moral de l'homme* he states that "physiology, the analysis of ideas, and moral philosophy are simply three branches of one and the same science, which may appropriately be designated as *the science of man.*[15] As evidence that this had been recognized by the exponents of Ideology, he pointed out that physiologists had been called to become members of the Class of Moral and Political Sciences, the section of the Institut National devoted to the analysis of ideas.[16] In further support of his insistence on a knowledge of man's normal and pathological structure and function as a necessary preparation for psychological study, Cabanis refers to the fact that John Locke was a physician, and that his discoveries in moral and social philosophy were preceded by a study of man's physical nature.[17]

The contributions of Cabanis to this subject are contained in his *Rapports du physique et du moral de l'homme.* In this work he presents a viewpoint which in some respects is reminiscent of the present-day "psychosomatic" approach. The living organism, argues Cabanis, must be regarded as a whole; and any kind of mental process, including sensation, must be studied as a function of the organism. In so doing, attention must be paid to all the factors, internal and external, that affect the body. Many effects produced on the organism do not rise to the level of consciousness, yet they affect the state of the mind. Cabanis was well aware of the influence of unconscious physical processes, such as digestion and glandular activity.[18] In his book, he showed that sensation varied with age, sex, temperament, climate, diet, and disease. In this connection, medicine is of

[14] F. A. Lange: *Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegenwart*, Leipzig, Alfred Kröner Verlag, 1926, vol. I, p. 286.

[15] P. J. G. Cabanis; *Rapports du physique et du moral de l'homme*, 3rd edition (2 vols.). Paris, 1815, vol. I, pp. 5-6.

[16] *Ibid.*, p. 5.

[17] *Ibid.*, p. 32.

[18] *Ibid.*, pp. 97, 102-106.

importance for the study of the mental faculties. By uncovering the nature of diseases that produce changes of sensibility, and by learning how to cure these diseases so that normal sensibility can be restored, medicine provides a means for uncovering and analyzing the very origin of sensations. In this work Cabanis developed the concept of what we today call the " total personality," as well as a functional conception of mind. In this sense, I believe, one must interpret his statement so often quoted that, " In order to obtain, a correct idea of the operations from which thought results, it is necessary to regard the brain as a particular organ, designed specifically to produce thought; just as the stomach and the intestines carry on digestion, the liver filters bile, and the parotids, maxillary and sublingual glands produce saliva." [19]

The work of Cabanis was widely read. After its first publication in book form in 1802, it went through eight editions, the last appearing in 1844.[20] The significance of the influence of Cabanis on medical thinking in France in the 19th century still requires a good deal of study before a final estimate can be given. There can be little doubt, however, of the existence of this influence. Even a cursory inspection of the writings on mental disease of Broussais, Esquirol, and Rostan shows that they were acquainted with the views of Cabanis and referred to them with approbation. It is interesting to note that Claude Bernard was acquainted with the work of Cabanis and refers to him several times.[21]

In general, Ideology tended to reinforce and foster the trend to empirical investigation in medicine. In this endeavor medical history was employed to strengthen the Ideologic position. Hippocrates becomes a forerunner of the analytic method.[22] This use of the Hippocratic tradition is of interest also because it is the analogue in medicine to the use of Greek and Roman history by the French revolutionaries.[23] The function of Hippocratism in Ideologic thinking on medical problems is to reinforce its realistic approach. This tendency found practical expression in the reform of medical education.

[19] *Ibid.*, p. 127.

[20] Louis Peisse: *La Médecine et les médecins. Philosophie, doctrines, institutions, critiques, moeurs, et biographies médicales* (2 vols.), Paris, 1857, vol. II, p. 358.

[21] Claude Bernard: *Leçons de pathologie expérimentale*, Paris, 1872, p. 455; idem: *Pensées. Notes détachées*, Paris, 1937, p. 65.

[22] Cabanis, *Rapports. . . .* vol. I, p. 23.

[23] Arthur Rosenberg: *Democracy and Socialism. A Contribution to the Political History of the Past 150 Years*, translated from the German by George Rosen, New York, Alfred A. Knopf, 1939, pp. 12-13.

IV

Ideology and Medical Reform

As a philosophy concerned not with metaphysical will-o'-the-wisps and abstract subtleties, but rather with practical human activities and ideas, it is not at all surprising to find the exponents of this philosophy introducing various innovations in the field of medicine, especially in the field of medical education.

The most widely known of these innovations is probably Pinel's removal of the shackles from the mental patients at the Bicêtre. In 1791, the Société royale de médecine had offered a prize for the best memoir on the most efficacious means for the treatment of mental disease. Pinel took part in this competition and his essay was mentioned at the public session of the following year. One of the judges was Thouret, who also frequented the salon of Madame Helvétius, and who knew Pinel. He was greatly impressed with the latter's ideas on the treatment of mental patients.[24] Consequently, when in the course of events Thouret, Cabanis, and Cousin, the latter also a friend of Pinel, were assigned as a triumvirate to reform the hospitals of Paris, they began by appointing Pinel physician to the Bicêtre. He was appointed on August 25, 1793, and entered upon his duties on September 11, 1793.[25] It was here and at the Salpêtrière, to which he was assigned two years later, that Pinel carried out the reforms and studies which opened up new perspectives in psychiatric practice and research.

As legislators the Ideologues were interested in educational reform, and took an active part in the reconstruction of medical education. The Convention abolished the medical faculties in 1793, but the exigencies of war and the need for a regulation of medical training led to the establishment of three medical schools (*écoles de santé*) at Paris, Montpellier and Strassburg.[26] These schools were created by the decree of the 14 Frimaire, Year III (December 4, 1794).[27]

The reconstruction of medical education was part of the program of

[24] Semelaigne, *op. cit.*, pp. 33, 42; Pariset, *op. cit.*, pp. 225-226; Zilboorg, *op. cit.*, pp. 319-326.

[25] Pariset, *op. cit.*, p. 42.

[26] Stephen d'Irsay: *Histoire des universités françaises et étrangeres*, 2 vols., Paris, Editions Auguste Picard, 1933-35, vol. II, pp. 142-143. Triaire, *op. cit.*, p. 92.

[27] d'Irsay, *op. cit.*, p. 149; A. Prévost: *La Faculté de médecine de Paris, ses chaires, ses annexes et son personnel enseignant de 1794 a 1900*, Paris, A. Maloine Editeur, 1900, *passim*; A. Prévost: *L'Ecole de santé de Paris (1794-1809)*, [Paris], 1901, *passim*.

reform initiated by the moderates after the 9th Thermidor (July 27, 1794). After the fall of Robespierre, Garat became minister of education. Cabanis, who had long been interested in educational reform, informed him of his views on the reorganization of medical education, particularly with regard to the application of analytic methods to the study of medicine. Garat, himself an Ideologue, regarded this project favorably, and encouraged Cabanis to present his ideas in book form. Part of this work was finished in 1795, but the book was never completed; the fragment was first published in 1804. It bears the title *Coup d'oeil sur les révolutions et sur la réforme de la médecine.*[28] This work is both a history of medicine, and a program for the reform of medical education. While the ideas presented in this book did not bring about the restoration of the medical schools, they do reflect the basic philosophy of the instruction given the students at the Paris medical school. Cabanis proposes that the students receive practical instruction at the bedside,[29] and that they be taught how to think logically.

The decree of 14 Frimaire, Year III, however, was the work of Thouret, Fourcroy and Chaussier. The initiative in this matter was taken by Fourcroy, who was supported by Thouret. At the request of the Committee on Education of the Convention, Fourcroy prepared a draft, which was edited and completed by Chaussier. This report on medical education was then read to the Convention by Fourcroy on the 7th Frimaire, Year III (27 November, 1794). This document became the basis for the law of the 14th Frimaire.[30]

Fourcroy, like Cabanis, insisted on the necessity of clinical bedside teaching, and this became the distinguishing feature of the new medical education. For this purpose three hospitals were associated with the medical school of Paris. These were *l'Humanité* for external diseases, *l'Unité* for internal diseases, and most interesting of all the *Clinique de perfectionnement*, or *Hôpital des cliniques*, for rare and complicated cases.[31] This latter establishment was intended not alone for the teaching of medical students, but also as a research hospital, or medical research institute, where rare diseases, would be studied, new remedies tried, and such research undertaken as would advance the art of medicine. Unwittingly, this was a partial realization of the proposal for a national health

[28] P. J. G. Cabanis: *Coup d'oeil sur les révolutions et sur la réforme de la médecine*, Paris, An XII, 1804. See also Picavet, *op. cit.*, pp. 184-196.
[29] Idem., *op. cit.*, pp. 358-362.
[30] Triaire, *op. cit.*, p. 92.
[31] A. Prévost: *La Faculté de médecine de Paris* . . . Paris, 1900, p. 100.

institute made eighty years earlier in England by John Bellers.[32] The original intention, however, was not fulfilled and by 1815 it had become a hospital for surgical patients.[33]

Nevertheless, the fundamental attitude underlying this proposal was not restricted to this hospital. This type of research was also carried on in other establishments. Bayle, in the preface to his book on pulmonary tuberculosis, states that without the enlightened regulations of the Paris hospital administration, this work could not have been prepared. For "by these wise regulations, doctors are provided with every means of study, and there is no particular research in which they are not aided." [34]

Thouret, Cabanis and the other medical Ideologues were not only interested in the reorganization of medical education, but also took an active part in the teaching program and the administration of the Paris school. Thouret became the first director of the school; Chaussier was appointed to the chair of anatomy and physiology; Pinel at first received the chair of hygiene and medical physics, later that of pathology; and Cabanis first taught medicine, and later legal medicine and medical history.

Similarly they took an interest in and fostered every endeavor to advance medical knowledge. As evidence may be cited the *Société médicale d'émulation* which was organized in 1796.[35] Among its members were Alibert, Bichat, Cabanis, Desgenettes, Fourcroy, Larrey, Pinel, Roussel, Sue [36] and Thouret. The preface to the first volume of memoirs published by the Society states that: "Citizen Thouret, a man of distinction and director of the Paris School honors us by his presence, and it is due to his attachment as much as to his zeal that we have a spacious and comfortable room for our meetings." [37] Further testimony to Thouret's interest in the Society is to be found in volume III of its Memoirs, which is dedicated to him. "The editors of these memoirs," we read, "pay homage to his zeal for the advancement of science, and pay a special tribute of gratitude

[32] John Bellers: *An essay toward the improvement of physick, in twelve proposals* . . . London, J. Sowle, 1714, pp. 7-10, Proposal V; see also George Rosen: An Eighteenth Century Plan for a National Health Service, *Bull. Hist. Med.*, 16: 429-436, 1944.

[33] John Cross: *Sketches of the Medical Schools of Paris* . . . London 1815, pp. 40-41.

[34] G. L. Bayle: *Recherches sur la phthisie pulmonaire*, Paris, 1810, p. xii.

[35] The first meeting of the Society was held on the 5th Messidor, Year IV (24 June, 1796), Triaire, *op. cit.*, p. 520.

[36] Sue was professor and treasurer of the Medical Faculty. He helped to edit the third edition of Cabanis' *Rapports*, for which he supplied a detailed alphabetical index; his son was Eugène Sue, the well-known author of the *Mysteries of Paris*.

[37] *Mémoires de la Société Médicale d'Emulation*, Séante à l'Ecole de Médecine de Paris . . . pour l'an V de la République Française, Première Année, Paris, An VI (1798), p. vi.

for the services which he has rendered to the Société médicale d'émulation." [38]

V

Conclusion

The rôle of Ideology and of its proponents in laying the foundation and providing the theoretical underpinning for those achievements of the French clinical school which have generally attracted the attention of historians has been indicated in the preceding discussion. It is obvious, however, that this important subject requires for its complete elucidation more intensive and detailed study. In the present contribution an attempt has been made to sketch the main outlines of the problem, and thus to indicate some avenues for future research.

[38] *Mémoires de la Société Médicale d'Emulation.* . . . Dedication.

WILLIAM PROUT AND THE DISCOVERY OF HYDROCHLORIC ACID IN THE GASTRIC JUICE

ANTHONY M. KASICH

Introduction

The production of hydrochloric acid by the gastric glands represents one of the most interesting phenomena of nature. The only other instance of a strong acid being formed by a living organism occurs in certain mollusks, which produce sulphuric acid, probably for purposes of defense.[1] Physiologic processes in general are so extremely sensitive to minute changes in the reaction of body fluids, that even in disease, the variations beyond the limits of pH 7.1 to pH 7.7 are incompatible with life. Nevertheless, in the stomach the parietal cell actually makes a substance whose acidity reaches a pH of 0.9 or less.[2]

Although the conception of fluid metabolism and its delicate mechanisms for the preservation of the acid-base balance is a modern development, the older physiologists undoubtedly knew that such extremes of acidity were incompatible with life. It is, therefore, easy to imagine the sensation which must have been caused among the scientific men of Prout's day by his disclosure,[3] in 1824, that he had found "free" hydrochloric acid in the gastric juice. While Prout's standing as a scientist was such that his words carried weight, the idea was so revolutionary that many years passed before it was generally accepted. Like other medical discoveries, the finding of hydrochloric acid in the gastric juice was the culmination of years of study on the part of many workers in many countries. In order to appreciate the significance of this striking revelation, it is well to trace briefly the development of gastric digestion up to the beginning of the nineteenth century.

Early Ideas of Digestion

The ancients from observation knew that digestion in principle consisted of converting solid materials into something soluble or at least semi-fluid. There were obvious differences between ingested and excreted

[1] Best, C. H. and Taylor, N. B., *The Physiological Basis of Medical Practice*, Edition 4, Baltimore, The Williams and Wilkins Company, 1945, p. 424.

[2] Personal Communication. Dr. F. Hollander.

[3] Prout, W. On the nature of the acid and saline matters usually existing in the stomachs of animals. *Phil. Trans. Roy. Soc.*, 114: 44, 1824.

matter. Naturally, attempts were made to explain the process by familiar mechanisms, such as heat, putrefaction, mechanical trituration, and fermentation.

The early history of digestion is connected with the names of van Helmont, Borelli, Sylvius, and Haller. Van Helmont,[4] disciple of Paracelsus, and an unusual combination of scientist and mystic, possessed a great deal of knowledge of digestion, some of which suggests modern chemical theory. His ideas are to a modern mind extremely vague, in spite of the fact that he weighed and measured and introduced the terms gas and ferment. He taught that the events of the human body are governed by a hierarchy of archei, all subject to the chief archeus.

Borelli,[5] a protagonist of the mechanical school, believed that " with a few exceptions, the crushing, erosion and the trituration of food is affected by the muscular stomach itself," though in quadrupeds he likened the process to the dissolution of metals by corrosive fluids. Sylvius [6] on the other hand, ascribed digestion to fermentation.

Advances in Gastric Physiology in the Eighteenth Century. Réaumur and Spallanzani.

The foregoing briefly describes the knowledge of digestion up to the eighteenth century. The formalism and theorizing of the latter period have been held in ridicule; and Garrison [7] wrote that " aside from a few original spirits like Morgagni, the Hunters, Wolff and Jenner, it was essentially the age of theorists and system-makers."

In general, these remarks are true. Nevertheless, in gastric physiology this era is noted for the work of Réaumur and Spallanzani who blazed a path into the unknown which every investigator has of necessity followed from that day to this.

But these men were, of course, rare exceptions. The best known physician of this time, Boerhaave " made no experiments, and seems to have contented himself with hashing up the half truths, and the whole errors of his time." [8] Boerhaave's celebrated pupil, Haller, who " lectured and wrote on surgery, and made a superb bibliography of the subject, but

[4] Foster, M., *Lectures on the History of Physiology during the Sixteenth, Seventeenth, and Eighteenth Centuries.* Cambridge, Cambridge University Press, 1901, p. 132 et. seq.
[5] *Ibid.*, p. 165.
[6] *Ibid.*, p. 166.
[7] Garrison, F. H., *An Introduction to the History of Medicine*, Ed. 3, Philadelphia, W. B. Saunders Company, 1921, p. 315.
[8] Allbutt, T. C. quoted by Garrison, F. H., *ibid.*, p. 320.

never performed an operation" was regarded as the "master physiologist of his time." [9] An idea of the current teaching of physiology of digestion is obtained from the following from his text on physiology, the American edition of which appeared in 1803:

> into the stomach . . . the aliments are let down . . . as alkalescent flesh, rancescent fat, or acescent vegetables. Here they are digested in a heat equal to that of incubation, imparted by the contiguous heart, liver and spleen . . . The aliments are macerated in a moist place with much air . . . at the same time they begin to corrupt into a nauseous liquid, often acescent, but at other times putrescent.[10]

Réaumur and Spallanzani. First Experiments on Digestion

It is a far cry from the wordy speculations of Haller to the modern experimental approach of Réaumur and Spallanzani. Réaumur utilized a kite, a species of buzzard, for his experiments. This bird vomits material which it cannot digest. Taking advantage of this trait, Réaumur was able to make fundamental advances in gastric physiology. He fed the kite metal tubes with holes punched in them, and stuffed the tubes with sponges. When the tubes were vomited, he squeezed the juice out of the sponges, and used it in his experiments. He showed that the juice was salty, that it actually dissolved meat and bones, and that it turned blue paper red.

Spallanzani devoted many years to the study of gastric physiology, and his books [12] on the subject are a milestone in the history of medicine. His experiments were made on various animals—birds, fishes, snakes, cats, sheep, dogs,—and like many other scientists he even experimented on himself. He proved by well devised and controlled studies that trituration played no part in digestion; [13] that gastric juice actually dissolved the food,[14] and that the contents of the stomach, not only were not putrid, but actually possessed "antiseptic" qualities.[15] He was extremely ingenious in his methods, and his books are interesting reading even today. Spallanzani conclusively proved the chemical nature of digestion, by showing that it can take place in vitro.[16]

[9] *Ibid.*, p. 324.

[10] Von Haller, Albrecht, *First Lines of Physiology*, Translated into English from the 3rd Latin Edition. Ed. 1 (American), Troy, N. Y., Obadiah Penniman and Company, 1803, pp. 317-318.

[11] Foster, M., *op. cit.*, p. 211.

[12] Spallanzani, L., *Dissertations Relative to the Natural History of Animals and Plants.* Translated into English by Thomas Beddoes. London, Printed for J. Murray and S. Highley, 1796. 2 vols.

[13] *Ibid.*, vol. 1, p. 273 et seq.

[14] *Ibid.*, p. 94.

[15] *Ibid.*, p. 347.

[16] *Ibid.*, p. 187.

The First Chemical Gastric Analysis in History

Although he suspected it, Spallanzani, because of the limitations of chemical knowledge at the time, failed to prove the presence of acid in the stomach. From personal experience, he knew the taste of his own juice, for he wrote of his sleep being disturbed because " the contents of my stomach would rise almost into my mouth, and then fall back again, leaving a most disagreeable sour taste behind." [17] From his experiments he had wrongly concluded that the acid in the stomach " was not perpetual, but depended upon the quality of the food." [18] Nevertheless, he submitted some of the crow's juice to his colleague Scopoli for examination—probably the first gastric analysis in history. Scopoli,[19] utilizing the crude methods then in use, reported: " The gastric juice of the crow precipitates silver from nitrous acid, and forms luna cornea. This phenomenon might induce us to suppose that common salt exists in the gastric fluid; but . . . the salt in this fluid is not common salt, but sal ammoniac . . . This salt is neither acid nor alkaline." [20]

John R. Young: Pioneer American Physiologist and the Discovery of Acid in Gastric Juice

In 1803, John Richardson Young submitted a thesis [21] based on original work to the University of Pennsylvania for the degree of doctor of medicine. Young wrote: " A piece of fresh veal was introduced into the empty stomach of one of the large frogs. In two hours, it was examined—the surface was a little tender; upon being touched with litmus paper, it was turned red. It appeared impossible at the same time to conceive, the meat could become sour, in so very short a time, and in so very low a temperature; it was therefore conjectured the acid was to be referred not to the meat, but to the gastric juice; which the following experiments confirmed us in. A frog was kept starving for two days; a piece of litmus was then forced into its empty stomach, by means of a pair of forceps; upon being drawn out it was covered with gastric juice, and the litmus turned red.

[17] *Ibid.*, p. 324.

[18] *Ibid.*, p. 326.

[19] Giovanni Antonio Scopoli, 1723-1788, professor of chemistry at the University of Pavia, performed this, the first recorded gastric analysis in history.

[20] *Ibid.*, p. 329.

[21] Young, J. R. *An Experimental Inquiry into the Principles of Nutrition and the Digestive Process.* (Thesis, University of Pennsylvania), Philadelphia, Eaker and Mecum, 1803, p. 40.

The naked gastric juice was afterwards often examined, by bringing it out with a teaspoon, and constantly was found to be slightly acid. Being thus fully persuaded, the acid in the digested foods of frogs did not arise from fermentation, but was to be referred to their gastric juice, we were led by analogy to suppose, the acid of our own stomachs was to be attributed to the same origin . . . I took some meat on an empty stomach: in half an hour afterwards, by irritating my fauces, the meat was thrown up, and with it some gastric fluid: Upon being tested, an acid was very evidently present. We have little hesitation, therefore, in saying, that the acid so constantly found in the stomach of man, and almost (probably) all animals, is to be referred to their gastric fluid." Young tried to identify the acid and after various chemical tests concluded that " the acid in the filtered fluid was phosphoric." [22] Thus by a mere turn of fate in the nature of an inadequate qualitative analysis, the credit for making an important discovery passed from America to England.

The Identification of the Acid in the Gastric Juice. William Prout: Early Life

William Prout [23] was born in Horton, Gloucestershire, January 15, 1785. Horton was a tiny hamlet, miles away from the high road, in a location so retired that for years it could boast neither a clergyman nor a resident squire. Prout's family was in comfortable circumstances, and had occupied the property for several generations.

Until the age of seventeen, Prout was in large measure self-educated. He was a precocious child, and read everything he could lay his hands on, being particularly fond of natural history. To supplement the educational opportunities at home, his family placed him under the care of the Reverend Mr. Turner, of Sherston, Wiltshire, and at a later period, at the academy of Dr. Jones, near Bristol. It was at Dr. Jones' recommendation that Prout began the study of medicine at Edinburgh. He was graduated in 1811, writing a thesis on Intermittent Fevers.

Prout at the University of Edinburgh

At Edinburgh, he studied anatomy under Alexander Monro, tertius. Of Monro's teaching, nothing good can be told, for it was said " he was insufferably careless and lazy " and " in all he did and said his manner

[22] *Ibid.*, p. 42.

[23] P. J. Hartog, *Dictionary of National Biography*, New York, Macmillan and Company, 1896, vol. 46, p. 426.

betrayed an impassioned indifference, as if it were all the same to him whether his teaching was acceptable or not. Monro's plan of adhering to the traditions of his predecessors was to read his grandfather's notes." [24]

In chemistry, however, the field in which he was to make his mark, Prout was fortunate in being taught by the great Thomas Charles Hope, one of the distinguished chemists of the day, whose lectures were characterized by "uncommon clearness of expression, and an unexampled splendour and success in experimental demonstration. His course was comprehensive, and he seems to have had the faculty of inspiring his students. It was in his time that the students founded a chemical society which met once a week to repeat the professor's experimental demonstrations,—the first attempt at practical study of this subject at Edinburgh." [25] Prout was undoubtedly a member of this club.

Another of Prout's teachers was Andrew Duncan, Senior, Professor of the Institutes of Medicine, "A man of singularly clear vision, boundless energy, and great perseverance." [26]

Prout Settles in London. Work at the Borough Hospitals. Lectures on Animal Chemistry.

Under the influence of Hope in chemistry and Duncan in physiology, Prout laid the foundations of a career which was to make him the foremost English chemist of his time. Settling in London, Prout continued his studies at Guy's and St. Thomas's Hospitals. He was undoubtedly drawn to Guy's by its famous staff which included Alexander Marcet, noted for his researches in chemistry, especially in its relation to diseases of digestion and of the urinary organs. Marcet had popularized the use of bismuth in stomach affections, and had discovered and named xanthine.[27] Though very young, Prout soon attracted attention by his earnest manner and brilliant mind, and made friendships which were to last throughout his life.

Prout's colleagues—the future "great men of Guy's," Richard Bright, Thomas Addison, and Thomas Hodgkin—were undoubtedly a strong stimulus to him. That he was well thought of is shown by the statement in Hodgkin's reference to the specimens of calculi in Guy's museum: "The Student is recommended to examine them in conjunction with the

[24] A. M. Footnotes to Medical History, *Edinburgh M. J.*, 48: 564, 1941.
[25] *Ibid.*, p. 565.
[26] *Ibid.*, p. 566.
[27] Wilks, S. and Bettany, G. T. *A Biographical History of Guy's Hospital*, London, Ward, Lock, Bowden & Co., 1892, p. 207-208.

perusal of the work of Dr. Prout, whose plan has been closely followed in the arrangement of the specimens." [28]

Prout soon gave indications of the course his life was to take, and his interest in clinical medicine was early submerged by his consuming fondness for chemistry, through which he felt the greatest progress in medicine was to come. His progress in his chosen field was rapid. Two years after his graduation from Edinburgh, Prout delivered a course of lectures on "Animal Chemistry" which aroused so much interest that they were largely attended, and it was noted that Sir Astley Cooper, the busiest surgeon in London was a constant listener. At about this time, Prout also made the acquaintaince of Matthew Baillie, physician to the King and famous pathologist. Baillie thought well of him and was later to be one of his proposers for Fellowship in the Royal Society.[29]

Marriage

Prout began private practice in 1814, and in the same year he married the eldest daughter of Alexander Adam, L. L. D., author of *Roman Antiquities*. Shortly afterward, he and his bride visited Paris during the short peace before Waterloo, and spent much time in the Louvre, which then contained the wonderful collection of works of art which had been gleaned by Napoleon and his generals from the chief galleries of the continent.

The Enunciation of Prout's Hypothesis. Fellowship in the Royal Society

A true appreciation of Prout's greatness will be realized if one remembers that he worked at a time when even the simplest apparatus available to school children today was unobtainable. Most of the equipment he used, some of it quite elaborate, was made by himself. Although engaged in practice, his chemical researches were occupying most of his time. He published an anonymous paper in 1815, "On the relation between the specific gravities of bodies in their gaseous state and their atoms." [30]

This was a startling paper from a young man of twenty-eight, and gave rise to what has become known to chemists as "Prout's Hypothesis." In this work Prout pointed out that there were grounds for believing that

[28] Hodgkin, T. Observations on Section VII of Part 11 (page 7), in *A Catalogue of the Preparations in the Anatomical Museum of Guy's Hospital*, London, S. Highley, 1829.
[29] *Med. Times*, 22: 15 (July) 1850.
[30] *Annals of Philosophy*, 7, 321.

the atomic weights of all elements are the exact multiples of either the atomic weight of hydrogen or half that of hydrogen. While Prout had no means at the time to furnish evidence in support of his hypothesis, this has stimulated the widest discussion among chemists, and is looked upon as a landmark in the history of the science. The current opinion of Prout as a man who had "original, clear and comprehensive views as to the state of physical science, . . . speculative yet practical in an eminent degree, and always in advance of the actual state of knowledge possessed by our most advanced thinkers" [31] was well deserved.

Prout had been elected to Fellowship in the Royal Medical and Chirurgical Society in 1814, and in 1818 he was proposed for Fellowship in the Royal Society by Matthew Baillie, Alexander Marcet and a group of other fellows with the following letter: "William Prout, author of several chemical and physiological papers, one of which was printed in the last volume of the Royal Society's Transactions,[32] being desirous of admission into the Royal Society, we, the undersigned, do, from our own personal knowledge recommend him as worthy of that honour, and as likely to become a very valuable and useful member." [33] The election took place March 11, 1819.

Announcement of the Discovery of Hydrochloric Acid in the Gastric Juice

It was on December 11, 1823, before the Royal Society of London that Prout read his famous communication "On the nature of the saline matters usually existing in the stomachs of animals." [34] This paper, a classic of scientific reporting, bears quoting:

> The object of the present communication is to show that the acid in question is the muriatic acid, and that the salts usually met with in the stomach are the alkaline muriates.

Having thus stated his premise, Prout proceeded with the experimental proof:

> The contents of the rabbit stomach fed on its natural food were removed immediately after death, and repeatedly digested with cold distilled water, until they ceased to impart anything to that fluid. The whole of these different portions of fluid, which always exhibited strong and decided marks of acidity, were then intimately mixed

[31] *London Med. Gazette*, 8: 468, 1831.
[32] Prout, W. Description of an acid principle prepared from the lithic or uric acid. *Phil. Trans. Roy. Soc.*, p. 420, 1818.
[33] *Med. Times*, 22: 15 (July), 1850.
[34] Prout, W. *Phil. Trans. Roy. Soc.*, 114: 44-49, 1824.

III. *On the nature of the acid and saline matters usually existing in the stomachs of animals.* By WILLIAM PROUT, *M. D. F. R. S.*

Read December 11, 1823.

THAT a free, or at least an unsaturated acid usually exists in the stomachs of animals, and is in some manner connected with the important process of digestion, seems to have been the general opinion of physiologists till the time of SPALLANZANI. This illustrious philosopher concluded, from his numerous experiments, that the gastric fluids, when in a perfectly natural state, are neither acid nor alkaline. Even SPALLANZANI, however, admitted that the contents of the stomach are very generally acid; and this accords not only with my own observation, but with that, I believe, of almost every individual who has made any experiments on the subject.

With respect to the nature of this acid, very various opinions have been entertained. Some of the older chemists seem to have considered it as an acid, *sui generis;* by others it was supposed to be the phosphoric, the acetic, the lactic acid,* &c. No less various have been the opinions respecting

* After I had discovered the principal fact related in this paper, I was surprized to find how nearly SCOPOLI had come to the same conclusion. He did not indeed come to the conclusion, as far as I can ascertain, that free muriatic acid exists in the stomach, but he advanced the opinion, that the muriatic acid, in union with ammonia, found in such abundance in the stomach of ruminating animals, is secreted by that organ itself. The only account of SCOPOLI's experiments I have seen is in JOHNSON's Animal Chemistry, i. 183.

together, and after being allowed to settle, were divided into four equal portions. 1. The first of these portions was evaporated to dryness, in its natural state, and the residuum burnt in a platinum vessel; the saline matter left was then dissolved in distilled water and the quantity of muriatic acid was determined in the usual manner; the proportion of muriatic acid, in union with the fixed alkali was thus determined. 2. Another portion of the original fluid was supersaturated with potash and then evaporated to dryness, and burnt, and the muriatic acid contained in the saline residuum determined as before. In this manner the total quantity of muriatic acid was ascertained. 3. A third was exactly neutralized with a solution of potash of known strength, and the quantity required for that purpose accurately noticed. This gave the proportion of free acid present; and by adding this to the quantity in union with a fixed alkali as determined above, and subtracting the sum from the total quantity of muriatic acid present, the proportion of acid in union with ammonia was estimated . . . But as a check to this result, the third neutralized portion above mentioned was evaporated to dryness, and the muriate of ammonia expelled by heat and collected. The quantity of muriatic acid this contained was then determined as before, and was always found to represent nearly the quantity of muriate of ammonia as before estimated; thus proving the general accuracy of the whole experiment beyond doubt. 4. The remaining fourth portion of the original fluid was reserved for miscellaneous experiments, particularly for the purpose of ascertaining whether it contained any other acid besides the muriatic. The experiments above mentioned seemed to preclude the possibility of the presence of any destructible acid; and the only known fixed acids likely to be present were the sulphuric and the phosphoric; the muriate of barytes, however, neither alone, nor with the addition of ammonia, produced any immediate precipitate, showing the absence of the two acids in any sensible quantity, and still further confirming the results as before obtained. The results then seem to demonstrate that free or at least unsaturated muriatic acid in no small quantity exists in the stomachs of these animals during the digestive process; and I have ascertained, in a general manner, that the same is the case in the stomachs of the hare, the horse, the calf, and the dog. I have also uniformly found free muriatic acid in great abundance in the acid fluid from the human stomach in severe cases of dyspepsia.

Source of the Hydrochloric Acid

That Prout's chemical knowledge and line of reasoning were sound has been proved by subsequent history. His explanation of the source of the acid, made many years before Arrhenius announced his theory of the dissociation of substances in solution, has a remarkably modern ring to it. "The source of this chlorine or muriatic acid must be the common salt which exists in the blood. The chlorine is, therefore, secreted from the blood; it may be demanded, what is the nature of the agency, capable of separating chlorine from a fluid so heterogeneous as the blood? We are acquainted with one agent, that exerts such a power, namely electricity . . . The decomposition of the salt of the blood may be fairly referred to the immediate agency of this principle, electricity. But here the question

arises—what becomes of the soda from which the muriatic acid has been disunited? The soda remains behind, of course, in the blood, and a portion of it, no doubt, is requisite to preserve the weak alkaline condition essential to the fluidity of the blood." [35] It is astonishing that with all the great advances made in physiology and chemistry of the last hundred years, how little has been added to Prout's concept of the formation of hydrochloric acid in the human stomach.

Corroboration of Prout's Work

Tiedemann and Gmelin [36] in the famous monograph on digestion which appeared in 1826 willingly gave Prout credit for the discovery, though they themselves had in February 1824 found free hydrochloric acid in the gastric fluid. These investigators asserted, however, that they found not only free hydrochloric, but also butyric and acetic acids in the juice. Other scientists did not see eye to eye with the English investigator. In 1825, Leuret and Lassaigne,[37] whose work won the prize offered by the Académie royale de science for original work on digestion, using horses and dogs, identified the acid in gastric juice as lactic, and looked upon Prout's work with disfavor. They boldly asserted that his conclusions were inaccurate because they were based upon incorrect analyses.

Analysis of Juice of Beaumont's Human Subject Supports Prout

Prout's results were to be confirmed from an unexpected quarter. William Beaumont in his classic researches on Alexis St. Martin [38] recognized the acid character of the gastric juice. He noted that " Its taste when applied to the tongue is similar to thin mucilaginous water, slightly acidulated with muriatic acid." [39] He proved his supposition true by sending samples to the University of Virginia, which were examined by Professors Dunglison and Emmett of the department of chemistry. " We were satisfied that the muriatic acid was present," they reported, " but had no conception that it existed to the amount met with in our experiments

[35] Prout, W. *Chemistry, Meteorology, and the Function of Digestion*, Treatise VIII of the *Bridgewater Treatises on the Power, Wisdom and Goodness of God, as Manifested in the Creation*, London, W. Pickering, 1834, p. 500.

[36] Tiedemann, F. and Gmelin, L. *Verdauung nach Versuchen*, Heidelberg and Leipzig, K. Groos, 1826.

[37] Leuret, F. et Lassaigne, J.-L. *Recherches physiologiques et chimiques pour servir à l'histoire de la digestion.* Paris, Mme. Huzard, 1825, pp. 115, 220.

[38] Beaumont, W. *Experiments and Observations on the Gastric Juice and the Physiology of Digestion.* Plattsburgh, F. Allen, 1833.

[39] *Ibid.*, p. 85.

here . . . The quantity of chloride of silver thrown down on the addition of the nitrate of silver was astonishing." [40] A sample was also forwarded to Professor Benjamin Silliman of Yale, who wrote Beaumont that "test papers of litmus were decidedly reddened . . . Nitrate of silver gave a dense white precipitate, which after standing five minutes in the sunlight, turned to a dark brownish-black, thus indicating muriatic acid." [41]

But old ideas die hard. In spite of work quoted above and that of Bracconet,[42] who in 1835 showed that in the alcoholic extract of fat-free gastric juice, upon adding zinc oxide, he obtained not crystalline zinc lactate but delinquescent zinc chloride, opinion was by no means unanimous. For many years thereafter, writers [43] on gastric physiology, if they did not completely deny the presence of hydrochloric acid in gastric juice, mentioned it merely as one of the acids present. Bence-Jones in 1850 wrote: "The gastric juice is a highly acid fluid. What acid it is has not been determined. Hydrochloric, prosphoric, acetic, lactic, and butyric acid have each been said to exist in the gastric juice." [44] It was not until 1852, two years after Prout's death, that final proof came. In their fundamental work on digestion and metabolism, Bidder and Schmidt [45] showed in many experiments, with both carnivorous and herbivorous animals, that gastric juice contains only hydrochloric acid and never under fasting conditions even a trace of lactic or any other acid. This work was generally accepted as final proof of Prout's discovery, and most of our present day concepts are in conformity to their ideas. Even as late as 1894, however, a textbook of clinical medicine [46] stated: "In health, after the ingestion of food the acidity of the gastric juice is due to the presence of lactic acid, but later mainly to hydrochloric acid."

The Copley Medal

What was considered during Prout's life his most important paper: "On the ultimate composition of simple alimentary substances, with some preliminary remarks on the analysis of organized bodies in general," [47]

[40] *Ibid.*, p. 79.

[41] *Ibid.*, p. 80.

[42] Bracconet, *Ann. de Chim. et de la Phys.*, 59: 249.

[43] Jackson, S. *The Principles of Medicine*, Philadelphia, Carey and Lea, 1832, p. 346 et seq. Carpenter, W. B. *Elements of Physiology including Physiological Anatomy*, Ed. 2 (American), Philadelphia, Blanchard and Lea, 1851, p. 267.

[44] Bence-Jones, H. *Lancet*, 1: 415 (May), 1850.

[45] Bidder, F. W. and Schmidt, K. *Die Verdauungssaefte und der Stoffwechsel*, Mittau und Leipzig, G. A. Rayer, 1852.

[46] Bury, J. S. *Clinical Medicine*, London, C. Griffin & Co., 1894, p. 273.

[47] *Phil. Trans. Roy. Soc.*, Part II, 355-388, 1827.

appeared in 1827. So highly regarded was this work, that it earned him the prized Copley medal. "The Royal Society has viewed with peculiar satisfaction," the commendation accompanying the award stated, "a new and accurate analysis described by Dr. Prout . . . We have hastened to stamp with the highest mark of our approbation this mode of analysis . . ." [48] Prout had achieved the pinnacle of success in his field and was generally regarded as the foremost English chemist, both at home and on the continent.

Fellowship in the Royal College of Physicians. Gulstonian Lectures and Controversy

Other honors came to Prout. In 1829 he was elected Fellow of the Royal College of Physicians, and in 1831 he was chosen Gulstonian lecturer. These lectures, "The Application of Chemistry to Physiology, Pathology and Practice" [49] aroused considerable discussion, much of it acrimonious. A strong prejudice existed in those days to chemical ideas, and he found it slow and difficult work to make head against such opposition. Then, too, it must be remembered that it was an era when public quarrels among medical men were common, and when virulent and vituperative personal antagonisms were aired in the journals. Hardly an issue appeared without a letter, frequently under a nom de plume, in which the writer accused the College of Physicians or Surgeons of favoritism, or slandered a contemporary. All this must have been good for the circulation of the journals, for editors frequently took the initiative in provoking dissension. The dispute of Wakely,[50] the editor of the *Lancet*, with Guy's Hospital, is a famous example. For years, he lost no opportunity of belittling Guy's, heaping abuse and poking fun at its physicians, calling Richard Bright a "heavy conceited person," and slyly suggesting that he worked hand in hand with a Mr. Holloway, a notorious quack. Thomas Addison was characterized as a "bundle of loquacity." All this seems strange to us now, but some of the greatest names in medical history were involved in these sterile disputations—men like Stokes, Bell, Hope, Corrigan, and others.

Science Versus Vitalism

Prout's lectures were well received by the profession, and when they were later published in book form, were flatteringly reviewed. But Wilson

[48] *Med. Times*, 22: 15 (July) 1850.

[49] *London Med. Gazette*, 8: 256-265, 321-327, 384-391, 1831.

[50] Wilks, S. and Bettany, G. T. *A Biographical History of Guy's Hospital*, London, Ward, Lock, Bowden & Co., 1892, p. 325.

Philip,[51] author of many widely circulated works on digestion, and best known for his " Experimental inquiry into the laws of the vital functions " took umbrage at some of Prout's remarks. Philip was a vitalist, and would naturally find much to criticize in Prout's views. It seemed preposterous to him that anyone could explain bodily functions on the basis of chemistry. " I may say with truth that no man is more sensible to the merits of Dr. Prout than he who addresses you," he wrote to the *London Medical Gazette*, " The ardour and success, indeed, with which he has applied himself to his favorite science, and the consequent authority . . . he possesses are the causes of the present communication. For in proportion to these will be the effect of any error he may be betrayed into . . . an error that arises from love of science which has enabled him to do so much." He went on to say that chemistry can give only an incomplete explanation of the workings of the body. The composition of the organs or of the agents which influence them, cannot be explained by chemistry but only by the study of the vital functions.

These observations seem mild enough, yet it was inevitable that they would arouse Prout, and the latter's pettish retort that " he was a good deal surprised at Dr. Philip's statements, which seem to be founded on mistakes from beginning to end," started a discussion which was to continue through many pages, and which at times seemed devoid of all professional dignity.

Philip lost no time in replying to Prout: " As Dr. Prout declares his only object is truth, I cannot exactly understand what he means by his threat to ' dip his pen in gall and spare me not.' " These arguments were in no way brief " letters to the editor " but dreary outpourings, pages in length, which went on from issue to issue. One wonders who could have found the time and patience to wade through these dry arguments. It is with relief that one comes to Prout's final rejoinder: " I am very much disappointed with the doctor's observations, for, instead of a liberal and enlightened spirit of criticism, having truth for its object, I can discover little else than ignorance . . . Turn which way I will, the conviction is forced upon me against my inclination that I am dealing with a man whose narrow views of physiology scarcely seem to extend beyond metaphysical subtleties, and in therapeutics beyond half a grain of blue pill."

This tedious dispute has no meaning for us now, and is merely mentioned to show what Prout had to contend with. He could well agree with Dunglison that: " There is a systematic obstinacy amongst Physiologists

[51] This controversy was carried on through many issues of the *London Medical Gazette*, vol. 8 and 9, 1831.

which requires time as well as evidence for its downfall, and one of the first things to be learned is to disinfect the mind of all bias, which is extremely difficult." [52] Those who were satisfied with an easy explanation of physiological phenomena, were not convinced by Prout. The latter's part in the discussion can be only defended by stating that to him vitalistic ideas were pure obscurantism, leading to intellectual complacency. and stifling scientific curiosity.

Prout's Books of Clinical Subjects

Several books on clinical subjects were written by Prout, treating disease from the point of view of chemistry and physiology. *An Inquiry into the Nature and Treatment of Diabetes, Calculus, and Other Diseases Connected with a Deranged Operation of the Urinary Organs* appeared in 1821. This book was widely popular, and showed the influence of Alexander Marcet, whose work at Guy's was frequently referred to. The third and subsequent editions of the book (the fifth was issued in 1845) were published under the title *On the Nature and Treatment of Stomach and Renal Diseases.* The Bridgewater Treatise [53] on *Chemistry, Meteorology, and the Functions of Digestion Considered with Reference to Natural Theology,* came out in 1834, with a third edition in 1845. The latter book was a strange mixture of science and religion, as its title would indicate, and it was inevitable that a book of this type would please neither the scientists nor the theologians. If we disregard the theological speculations, however, there is much of value in the book. Prout's explanation of the source of the hydrochloric acid alone would atone for the labor of wading through the strange volume. It is heavy going and while this book was considered during Prout's lifetime to be his chef-d'oeuvre, it has added little to his later fame.

Personal Characteristics

Fashions in medicine change, in medical ethics as well as in therapeutics, Prout lived at a time when great fortunes were made in the practice of

[52] Letter of Robley Dunglison to William Beaumont in Myer, J. S., *Life and Letters of Dr. William Beaumont,* St. Louis, C. V. Mosby Co., 1912, p. 161.

[53] The Bridgewater Treatises were popular scientific works in their day, and were widely circulated. The following note describes their nature: "The Right Honourable and Reverend Francis Henry, Earl of Bridgewater, left a sum of eight thousand pounds sterling . . . with the dividends thereon . . . at the disposal of the President . . . of the Royal Society of London . . . to be paid to the person nominated by him . . . who will write, print, and publish one thousand copies of a work 'On the Power, Wisdom, and Goodness of God; as manifested in the Creation.'" *Chemistry, Meteorology and the Function of Digestion,* Prout, W. London, W. Pickering, 1834, p. vii.

AN

INQUIRY

INTO

THE NATURE AND TREATMENT

OF

DIABETES, CALCULUS,

AND OTHER

AFFECTIONS OF THE URINARY ORGANS:

With Remarks

ON THE IMPORTANCE OF ATTENDING TO THE STATE OF THE URINE IN ORGANIC DISEASES OF THE KIDNEY AND BLADDER: AND

SOME PRACTICAL RULES

FOR DETERMINING THE NATURE OF THE DISEASE FROM THE SENSIBLE AND CHEMICAL PROPERTIES OF THAT SECRETION

By WILLIAM PROUT, MD. FRS.

FROM THE SECOND LONDON EDITION,

REVISED AND MUCH ENLARGED:

WITH NOTES AND ADDITIONS

BY S. COLHOUN, M.D.

MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, CORRESPONDING MEMBER OF THE MEDICAL SOCIETY OF LONDON, &c.

Philadelphia:

PUBLISHED BY TOWAR & HOGAN.

W. Brown, Printer.

1826.

CHEMISTRY METEOROLOGY
AND THE FUNCTION OF DIGESTION
CONSIDERED WITH REFERENCE TO
NATURAL THEOLOGY

BY

WILLIAM PROUT M.D. F.R.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS

LONDON
WILLIAM PICKERING
1834

medicine and the facts advertised. Indeed, a physician's income was an index of his eminence. Everyone seems to have known that Sir Astley Cooper's annual income reached 21,000 pounds, and the story of the merchant prince who tossed a check for a thousand guineas in his nightcap after a successful operation was common knowledge.[54] Even Thomas Addison—aloof and retiring—enjoyed an income of 800 pounds from his lectures alone.[55] Prout was not primarily a clinician, and his reputation for laxity in charging his patients, combined with extravagance in scientific experiments, prevented him from achieving the financial success of many of his colleagues. His extraordinary diffidence, his absorption in scientific work, and the crippling infirmity which overtook him early in life, did not make for worldly success. A contemporary[56] has written of him:

> The great majority of persons who have attained eminence have been early risers, and to this class Dr. Prout emphatically belonged. Winter and summer, he breakfasted at seven, and always devoted a portion of the early morning to work. During the forenoon and until dinner he saw his patients, and again in the evening until ten. He never went out after that. His habits were studious and reserved, and the affliction of deafness under which he laboured for many years before his death, prevented him from entering into society. In appearance, he was the beam ideal of the physician of the old school. He was of middle height, and of slim figure. His head was nobly developed, and the intellectual qualities strongly marked; the hair soft and snowy white. His features were delicately chiselled, eyes brilliant, complexion very pale, but the expression of his countenance combined benevolence with great intelligence. There was a blandness in his manner which inspired confidence, and set the most nervous patient at ease. He always dressed with scrupulous neatness, usually in black, with gaiters or silk stockings.
>
> Were it the custom in this country to bestow honours on those who devote their time, their talents, and their lives to their fellow creatures, such researches as Dr. Prout's would not have passed unrecognized. But deeds in arms and in diplomatic arts, improvements in shells and rockets for the destruction of life, monopolize such distinctions, whilst the gratitude of the afflicted, with the good opinion of mankind, are the chief rewards to be looked forward to by the philanthropic physician.

Prout's Death

"Although ailing for some time, Dr. Prout's decease was unexpected. On the morning of the ninth of April, he had attempted to see a patient, but was unequal to the effort. In the afternoon a change for the worse took place, and he breathed his last in the evening, his intellect remaining un-

[54] Wilks, S. and Bettany, G. T. *A Biographical History of Guy's Hospital*, London, Ward, Lock, Bowden and Co., 1892, p. 325.

[55] *Ibid.*, p. 223.

[56] *Med. Times*, 22: 15 (July), 1850.

clouded to the end. In deference to his wish no post mortem was made, but there is little doubt that an abscess bursting into the lungs caused his death." He was buried in Kensal-Green, not far from the resting place of his colleague, Richard Bright.

Prout's Contribution to Medicine not Appreciated by His Contemporaries

Prout's death was noted in all the medical periodicals.[57] He was extolled as a chemist and scientist, and it was noted with pride that he had accomplished much in his chosen field with little assistance, at a time when chemistry was still in the embryonic stage of its development. Had he lived in the present age, had he been discovered and supported by some of our institutes of research, he would have been an investigator of renown in the domain of physiology, and its application in clinical medicine. Much was made of his work on the urine, kidney stones, and diabetes which had won him a European reputation. But posterity has placed a truer value on Prout's work. All the researches and books which his contemporaries thought so important, have been deservedly forgotten. His discovery of hydrochloric acid in the gastric juice, and his demonstration that this acid and none other was under normal circumstances present, a discovery of fundamental importance marking the initial step in the explanation of the chemistry of digestion, which assures Prout a secure place in medical history, was disregarded and not even mentioned in his obituaries.

[57] *London. Med. Gazette*, 45:659, 1850; *London Med. Journal*, 2:506 (May), 1850; *Med. Times*, 21:289, 1850; *Med. Times*, 22:15 (July), 1850.

THE PROGRAM OF THE ANNUAL MEETING

Hotel Claridge, Atlantic City, N. J.

May 26-27, 1946

All sessions, except the dinner session, were held in the Binnacle Room.

Sunday, May 26, 1946

3:00 p. m. Council Meeting.

8:00 p. m. Symposium on Benjamin Rush.

L. H. Butterfield, Princeton, N. J.
Benjamin Rush: a Physician as Seen in His Letters.

Fritz Wittels, New York, N. Y.
The Contribution of Benjamin Rush to Psychiatry.

General Discussion, and Inspection of the Rush Exhibit.

Monday, May 27, 1946

MORNING SESSION

9:00 Claudius F. Mayer, Washington, D. C.
Research and Medical History

ANCIENT MEDICINE

9:15 Erwin H. Ackerknecht, New York, N. Y.
Contradictions in Primitive Surgery.

9:30 Bernhard W. Weinberger, New York, N. Y.
Further Evidence that Dentistry was Practiced in Ancient Egypt, Greece and Phoenicia.

9:45 Benj. L. Gordon, Atlantic City, N. J.
Curiosities of Ancient Jewish Medicine.

10:00 Arturo Castiglioni, New Haven, Conn.
*On the Medicine of Pliny.**

10:15 Pan. S. Codellas, San Francisco, Calif.
The Case of Small Pox of Theodorus Prodromus (12th c.).

10:30 Edward H. Hume, New York, N. Y.
A Note on the Former Han Dynasty †

Five minute intermission

* Read by title, but printed with the transactions of the meeting.
† Read by title. It will be published in a subsequent issue of this *Bulletin*.

AMERICAN MEDICINE

10:50 M. Pierce Rucker, Richmond, Va.
Giles Heale, the Mayflower's Surgeon.

11:05 Benjamin Spector, Boston, Mass.
Noah Webster: His Contribution to American Medical Thought and Progress†

11:20 Howard Dittrick, Cleveland, Ohio.
A Cleveland Drug Store of 1835.‡

11:35 Henry R. Viets, Boston, Mass.
*Nathan P. Rice, M.D., and his "Trials of a Public Benefactor, as Illustrated by the Discovery of Etherization," New York, 1858.***

11:50 Maurice S. Jacobs, Philadelphia, Pa.
Philadelphia in 1846: Men and Events that Influenced the Development of Organized Medicine.

12:05 Hyman I. Goldstein, Camden, N. J.
*The History of Medical Education, and of Some Medical Men, in New Jersey.****

12:20 Hyman Morrison, Boston, Mass.
The Chapter on Appendicitis in a Biography of Reginald Heber Fitz.

12:35 Ludwig Edelstein, Baltimore, Md.
William Osler's Philosophy.

AFTERNOON SESSION

2:00 Business Meeting.

2:25 Awarding of the William Osler Medal.

2:30 The Fielding H. Garrison Lecture
John F. Fulton, New Haven, Conn.
The History of Science in American Universities.

Five Minute Intermission

EUROPEAN MEDICINE

3:20 Max H. Fisch, Cleveland, Ohio.
"Nicolaus Pol Doctor 1494."

3:35 Charles F. Mullett, Columbia, Mo.
The Bubonic Plague in England: a Problem in Public Health.

† This paper will be published in a subsequent issue of this *Bulletin.*
‡ To be published in *Ohio State Archaeological and Historical Quarterly.*
** Read by title, but printed with the transactions of the meeting.
*** Manuscript not received for publication.

3:50 Walther Riese, Richmond, Va.

The 150th Anniversary of S. T. Soemmerring's "Organ of the Soul" (1796); the Reaction of his Contemporaries and its Significance Today.

4:05 Owsei Temkin, Baltimore, Md.

Materialism in French and German Physiology of the Early Nineteenth Century.

4:20 George Rosen, New York, N. Y.

The Philosophy of Ideology and the Emergence of Modern Medicine in France.

4:35 A. M. Kasich, Weehawken, N. J.

William Prout and the Discovery of Hydrochloric Acid in the Gastric Juice.

DINNER SESSION

Speakers:

Joseph H. McNinch, Washington, D. C.

Plans for the Preparation of a History of the Activities of the Medical Department of the Army during the Recent War.

I. S. Ravdin, Philadelphia, Pa.

*Experiences in the China-India-Burma Theater.**

* Manuscript not received for publication.

MEETING OF THE COUNCIL

SUNDAY, MAY 26, 1946

Hotel Claridge

E. B. KRUMBHAAR, M. D., presiding.

I. *Opening of the Meeting by the President.*

President Krumbhaar called the meeting to order and expressed his pleasure that despite various unfavorable conditions, including a railroad strike terminated less than 24 hours before the meeting, some thirty-five members of the Association had been able to arrive in time for the Council meeting. To illustrate the enthusiastic interest in the resumption of the annual meetings, he pointed to the fact that, of the 24 papers listed for presentation at the three sessions, all but 4 had been offered voluntarily. He regretted that the heavy program would necessitate adhering as closely as possible to the printed schedule, thus leaving little if any time for discussion of the papers, but reminded the members the papers would be printed in full in the *Bulletin*. The following business was then transacted.

II. *Reports of the Officers.*

1. *Report of the Secretary*, Dr. W. B. McDaniel, 2d:

It must be obvious to the least secretarial minded that keeping an Association's membership securely tied to the secretarial and thesaural apron strings in wartime is no easy matter. That is particularly true in an Association such as ours, in which we are all blithe spirits governed (if at all) by a Constitution singularly well adapted not to depress us in any way. It is fairly safe, for instance, to assume that a duly elected member who has his dues paid up is a member at any given moment. But if a member, for any reason, fails to make his annual bow to the East, it is hard to determine at what juncture in the strained relations a bill of divorcement is to be shot at him, or, indeed, by whom. In wartime, the nuances become finer as the lines of communication become more tenuous; while the Tinkers to Evers to Chance play among treasurer, editor, and secretary remains the same joyous potential source of human error that it always is.

The secretary, therefore, hesitates to speak with pontifical assurance on the present status of the membership. But there are greater blithe spirits and lesser blithe spirits, and he recognizes that the latter (of whom he is one) are particularly fond of statistics. So, with the above reservations duly registered, along with an expression of deep gratitude to his associate Miss Clara Manson, he respectfully submits the following:

The Association suffered a loss of 17 active members during the past year, five of these unfortunately without hope of recall. Many of the others will doubtless return contritely as soon as conditions permit them to return to their proper senses. Two Constituent Societies were dropped, as several others were during the war,

for failure to make obeisance to the treasury. There can be little doubt, however, that these Constituent Societies, too, will return to the fold as soon as they have become reactivated locally. Their general temper can perhaps best be indicated by stating that of the Society reports submitted at this meeting, two come from Societies which are evidently blissfully unconscious that they have acquired a record of delinquency.

For the brighter side of the medal, it is a pleasure to record the addition of 16 new active members and 2 new corresponding members, as follows:

Active Members

Fanny J. Anderson, Detroit, Mich.
William W. Blair, M. D., Pittsburgh, Pa.
John E. Dotterer, M. D., State College, Pa.
Leonard E. Egerman, M. D., Pittsburgh, Pa.
Urban H. Eversole, M. D., Boston, Mass.
Joseph Feldman, M. D., Hartford, Conn.
Herman Frack, M. D., Oak Park, Ill.
Ernest M. Gruenberg, M. D., New York, N. Y.
Nora Guthrey, Rochester, Minn.
A. M. Kasich, M. D., Weehawken, N. J.
Catharine Q. Knop, M. D., Rochester, Minn.
Carl Leveson, Major (MC), Ashford General Hospital, W. Va.
Joseph H. McNinch, Col. (MC), Washington, D. C.
Emil A. Naclerio, M. D., Boston, Mass.
Herbert Reichner, New York, N. Y.
Ilza Veith, M. A., Baltimore, Md.

Corresponding Members

Walter R. Bett, M. D., London, Eng.
Herbert Molser, M. D., Elizabethville, Belgian Congo.

The membership, as of May 25, 1946, is divided as follows:

Active Members	425
Active Members with Temporary Inactive Status	40
Honorary Members	12
Corresponding Members	9
Constituent Societies	18
Total Membership	504

This may be compared with the total of 507 members recorded in our last report. As the terminal date of that report was June 15, 1945, however, it may be permitted to turn covetous eyes on the names of 6 candidates for membership awaiting consideration by the Council this afternoon. If that be allowed, this report on the membership may conclude on the note of optimism that all desire—though, let me hasten to add, with no credit whatsoever accruing to the secretary but with a great

deal due to other faithful members of the Association and to the animation of the Association itself.

The soul of the Association is the corporeal meeting of the blithe spirits, if I may be allowed the metaphysical metaphor. Nothing proves the substantial nature of that soul more clearly than the epicurean feast which the members have provided for us. The secretary regrets exceedingly that he badly misgauged the time required to get the printed programs in circulation. Other circumstances, beyond our control, have contrived to decimate our ranks at this meeting. The holding operation thus ends not quite as we had planned and hoped. But, with so much that is good before us, we have no reason, I think, to be downhearted.

2. *Report of the Treasurer.* Dr. William G. Leaman, Jr., reporting for the calendar year 1945:

BALANCE ON HAND JANUARY 1, 1945		$810.89
RECEIPTS		
1942 dues for 1 Constituent Society at $10.00	$ 10.00	
1944 dues for 4 members at $5.00	20.00	
1944 dues for 2 Constituent Societies at $10.00	20.00	
1945 dues for 400 members at $5.00	2,000.00	
1945 dues for 16 Constituent Societies at $10.00	160.00	
1946 dues for 6 members at $5.00	30.00	
		$2,240.00
1945 subscription to Bulletin of the History of Medicine		5.00
Partial payment of dues for two members (both members resigned, entire amount sent to Institute of the History of Medicine)		8.00
Amount sent by member for bill owed Johns Hopkins Press		1.75
Amount sent by member for bill owed Johns Hopkins Press		3.75
		$3,069.39*
DISBURSEMENTS		
Subscriptions to Bulletin of the History of Medicine		
Check No. 26, March 12, 1945	$1,262.00	
Check No. 28, June 4, 1945	268.00	
Check No. 36, December 31, 1945	236.00	
		$1,766.00
Printing, binding and stationery		
Check No. 32, July 16, 1945	20.00	
Check No. 34, November 7, 1945	14.25	
Check No. 35, December 31, 1945	13.00	
		47.25

* Of which $219.13 are deposited by T. G. H. Drake in the Royal Bank of Canada Savings Department, Yonge and College Street Branch, Toronto, Savings Account No. 757. The remainder is deposited in the First National Bank of Philadelphia, Pa.

Stamps		
Check No. 24, February 5, 1945	12.00	
Check No. 29, June 9, 1945	10.00	
Check No. 30, June 9, 1945	3.00	
Check No. 33, November 7, 1945	3.00	
		28.00
Secretarial Work		
Check No. 21, January 31, 1945	25.00	
Check No. 22, January 31, 1945	50.00	
		75.00
Executive Committee Meeting Expenses		
Check No. 23, January 31, 1945	9.01	
		9.01
1945 subscription to Bulletin of the History of Medicine		
Check No. 25, February 19, 1945	5.00	
		5.00
Bills of Members (amounts paid to Association along with dues)		
Check No. 27, April 20, 1945	1.75	
Check No. 31, July 10, 1945	3.75	
		5.50
Bank charges for handling account	8.16	
	.50	
	1.17	
	.68	
		10.51
TOTAL DISBURSEMENTS		$1,946.27
BALANCE ON HAND DECEMBER 31, 1945		$1,123.12*

PRELIMINARY TREASURER'S REPORT, JANUARY 1 to MAY 24, 1946

BALANCE ON HAND JANUARY 1, 1946		$1,123.12
RECEIPTS		
1945 dues for 4 members at $5.00	$ 20.00	
1945 dues for 2 Constituent Societies at $10.00	20.00	
1946 dues for 357 members at $5.00	1,785.00	
1946 dues for 16 Constituent Societies at $10.00	160.00	
		$1,985.00
		$3,108.12†

* Of which $219.13 deposited by T. G. H. Drake in the Royal Bank of Canada Savings Department, Yonge and College Street Branch, Toronto, Savings Account No. 757. The remainder is deposited in the First National Bank of Philadelphia.

† $903.99 in First National Bank of Philadelphia.
$219.13 in Canadian deposit.

DISBURSEMENTS

Subscriptions to Bulletin of the History of Medicine		
Check No. 44, April 29	$1,516.00	
		$1,516.00
Printing, binding and stationery		
Check No. 41, February 11	$ 2.75	
Check 43, March 5	10.25	
Check No. 46, May 21	9.25	
Check No. 47, May 23	120.13	
		142.38
Stamps		
Check No. 40, January 21	$ 15.00	
		15.00
Secretarial work		
Check No. 37, January 10	$ 25.00	
Check No. 38, January 10	50.00	
		75.00
Expenses (travelling, phone calls, etc.) incurred (up to and including May 24, 1946) in connection with annual meeting of Association at Atlantic City		
Check No. 39, January 17	$ 19.00	
Check No. 42, February 21	1.20	
Check No. 45, May 18	4.50	
Check No. 48, May 24	20.00	
		44.70
Bank charges for handling account	$ 2.89	
	5.34	
		8.23
TOTAL DISBURSEMENTS		$1,801.31
BALANCE ON HAND MAY 24, 1946		$1,306.81*

3. *Report of the Editor,* Dr. Henry E. Sigerist:

Throughout the war, the *Bulletin of the History of Medicine* was published with considerable delay and in the autumn of 1945 it was hoped that it would be possible to resume the publication on schedule. Conditions in the printing trade, however, have not improved and actually seem to be worse than during the war so that the *Bulletin* is still issued two months behind schedule. It is needless to say that the Editors will make every effort to accelerate its publication.

The event of the year was the launching of Henry Schuman's *Journal of the History of Medicine and Allied Sciences.* The need for a second English-language periodical devoted to the history of medicine was discussed at this place in detail a

* $1087.68 in First National Bank of Philadelphia.
$219.13 in Canadian deposit.

few years ago and it is a great satisfaction to know that the need for such a journal has now been satisfied and that it is issued with so competent an Editor. The new journal will relieve us of a great burden and will permit us to publish papers with a minimum of delay. The cooperation between the two periodicals is the most cordial.

During the year 1945, Volumes XVII and XVIII of the *Bulletin* have been published. Volume XVII had 574 pages and Volume XVIII had 583, a total of 1130. The two volumes together contained:

1 editorial
33 main articles
10 texts and documents
1 bibliography
11 notes and comments
9 reports on medico-historical activities
41 book reviews
84 illustrations

Of material especially concerning the Association, the *Bulletin* included:

1. Bibliography of the History of Medicine in the United States and Canada—1944 (Volume XVII, pp. 477-513).
2. Memoirs of 4 deceased members (Volume XVIII, pp. 185-212).
3. Reports of the officers (Volume XVIII, pp. 213-220).
4. Reports of constituent societies (Volume XVIII, pp. 221-227).
5. Announcements of the Association and its constituent societies in almost every number.

Volume XIX is in course of publication and the May number, 1946 will contain the Bibliography of the History of Medicine in the United States and Canada for 1945. Under normal conditions, the January number of this year would have included a new List of Members, but in view of the fact that so many of our members are returning from the armed forces and may have new addresses, it was thought better to postpone the printing of a new List of Members to January 1947.

No *Supplement* to the *Bulletin* was published in 1945 but one has been issued in the beginning of this year and three more are in the press. The reception of the *Supplements* has been a gratifying one.

The final status of the *Bulletin* at the end of 1945 was the following:

Receipts

Subscriptions of members of the AAHM	$1,984.00
Subscriptions to the Johns Hopkins Press	1,824.36
Sale of back numbers	282.57
Advertisements	656.20
Contribution of the Johns Hopkins Institute of the History of Medicine	2,243.93
	$6,991.06

Expenditures

Printing and binding of Volumes XVII and XVIII	$6,251.95
Commission to Press	604.55
Postage	112.64
Miscellaneous expenditures	21.92
	$6,991.06

One thousand copies were printed; the cost of production per page including foreign type and illustrations amounted to $5.53, and the cost of production of one set of two volumes, not counting the commission to the Press amounted to $6.25.

After the publication of Volume XX, the Editors expect to publish an Index of Volumes I-XX that will be supplied free of charge to members of the Association and other subscribers.

The Editor wishes to express his great appreciation to his Associate Editor, Miss Genevieve Miller, who during the year has carried by far the greater part of the burden.

III. *Appointment of Auditors by the President*

Dr. Krumbhaar appointed Dr. Dittrick and Dr. Larkey as auditors of the treasurer's report, to make their report to the Association at the Business Session on the following afternoon.

IV. *Reports of the Committees*

1. Executive Committee of the Council

As the Executive Committee had no business to transact other than that connected with memberships, the secretary assumed that his general report, which covered this business, would suffice.

2. Fielding H. Garrison Lecture Committee

The Committee recommended that an invitation to deliver the Fielding H. Garrison Lecture be extended to Dr. John F. Fulton, Sterling Professor of Physiology, Yale University, School of Medicine, and is glad to report that Dr. Fulton accepted the invitation and will deliver his lecture to-morrow on the subject of "Science in American Universities 1636-1946 with Particular Reference to Harvard and Yale."

3. Committee on Medals

Welch Medal. The president recalled that circumstances had not yet made it possible to establish the William H. Welch Medal, and expressed the hope that it might be possible to do so in the near future.

Osler Medal. The Committee is glad to report that while last year it was unable to award an Osler Medal, this year the standard of the essays submitted was considerably higher. Four essays were submitted by students of the College of Medical Evangelists at Los Angeles, California; University of Georgia, School of Medicine; Harvard University, School of Medicine; and McGill University, Faculty of Medicine. After careful consideration the Committee decided to recommend the awarding of the Osler Medal for 1946 to Mr. Peter Kellaway of McGill University for his

essay "The Part Played by Electric Fish in the Early History of Bioelectricity and Electrotherapy." The choice was determined by the fact that Mr. Kellaway's essay is a solid piece of research based on primary sources and represents an original contribution to medical history.

The Committee further recommends that an honorable mention be awarded to Mr. L. L. Uzman for his essay, "Constantine the African," an essay which while it does not advance our knowledge of the subject, yet shows a good understanding of a very complicated problem of the history of medical literature.

4. Committee on Relations with Central and South America

Dr. Esmond R. Long, chairman, made a brief oral report, stating that, owing to the war, it had been impossible for the committee to undertake any specific projects. He referred to, as a step forward in strengthening the cordial relations between the Americas, the considerable number of Latin American students now taking graduate courses in our medical schools.

5. Committee on Research in the History of American Medicine

Prof. Richard H. Shryock, chairman, reported orally that the committee had been inactive except for the work of its sub-committee on the bibliography of medical history of the United States and Canada, reported on by its chairman, Miss Genevieve Miller, below.

5a. Sub-committee on the Bibliography of Medical History of the United States and Canada

The work of this sub-committee has been continued along the same line as in the past. The publication of the 1945 Bibliography of the History of Medicine of the United States and Canada in the May, 1946 issue of this *Bulletin* (Vol. XIX, pp. 536-567) was made possible by the active cooperation of the following committee members: Mr. Whitfield J. Bell, Jr., Dickinson College, Carlisle, Pa.; Mr. Philip M. Benjamin, Librarian of Allegheny College, Meadville, Pa.; Dr. W. W. Francis, Librarian of the Osler Library, McGill University; Miss Elizabeth E. Schramm, New York; Dr. George Urdang, Director of the American Institute of the History of Pharmacy, Madison, Wis.; and Dr. B. W. Weinberger, New York. Mr. Bell has resumed his work with the committee after an absence of several years while he was engaged as a Volunteer in the American Field Service in Europe. The distribution of the various fields of medical history among the committee members was explained in the report made last year (*Bull. Hist. Med.*, 1945, 18: 219). Additional items were again submitted by librarian members of the Association to whom preliminary galleys were sent.

Each year we receive an increasing number of requests for the Bibliography. The following institutions were added to our mailing list during the past year: Provincial Library, Victoria, British Columbia; Library of the City College of New York; Lillian W. Florsheim Memorial Library, Michael Reese Hospital, Chicago, Ill.

V. *Reports of the Constituent Societies*

The American Institute of the History of Pharmacy, Madison, Wis.

The work of the Institute (A. I. H. P.) has progressed satisfactorily. A detailed

report, containing *lists of the contributions* to the members (and of the publications of the Director not already mentioned among these contributions), can be obtained at request.

Among the thirteen contributions the issuance of a volume entitled *American Pharmaceutical Documents 1643 to 1780* is especially worthy of notice. The volume consists of four issues of the *Badger Pharmacist*, each containing one commented upon document published by the late Dr. Edward Kremers between 1937 and 1940, preceded by an "Introduction and Supplement" written by the Director of the A. I. H. P. The issuance of the book was made possible by Eta (Madison) Chapter of Rho Chi, national pharmaceutical fraternity.

The *publication of historical pages* (pictures with explanatory legends and references to literature) in the monthly, *The American Professional Pharmacist*, started by the Director of the Institute in February 1941 and continued in every issue of the journal, has gained growing attention expressed in applications by other periodicals to be allowed to reprint the series in part or in full, and in requests for reprints by institutions and individuals.

The *correspondence and historical information* asked for has grown continuously and occupies a considerable part of the time and endeavor of the Director of the A. I. H. P. It seems remarkable that the number of inquiries is increasing not only as far as historians in the same or neighboring fields and practitioners of pharmacy and medicine are concerned, but almost to the same extent on the part of students and finally of laymen, among them journalists and authors of novels, *etc.*, eager to have their stories correct.

The *connections abroad*, especially with Latin American historians, could be extended.

The collection of material for a *History of Pharmaceutical Education in the United States of America* is progressing.

The collection of material for a *History of Military Pharmacy in the United States of America*, to be written by Dr. Ralph Bienfang of the College of Pharmacy of the University of Oklahoma under the auspices of the A. I. H. P., has been started.

An invitation of the Library of Congress to participate in the preparation of the *United States Quarterly Book List* has been accepted by the Director of the A. I. H. P.

The aim of the American Institute of the History of Pharmacy remains unchanged. It consists in equipping the pharmacist for citizenship in the world of intellectual and moral responsibility by making him familiar with the non-technical aspects and humanistic ramifications of his profession, and in doing pharmacy's share in the cooperative endeavor to make the historical record of world civilization as complete as possible.

GEORGE URDANG,
Director.

The Boston Medical History Club.

The twenty-fourth year of the Boston Medical History Club, which is hereby being reported, was marked by a renewed interest by both physicians and students. Despite the war years, there are now ninety-two paid members on its roster. The

Club held seven meetings from October through April and a list of the speakers and subjects follows:

Professor J. Walter Wilson	*The History of the Cell Theory and Its Application to Modern Medicine.*
Professor M. F. Ashley Montagu	*Primitive Medicine.*
Dr. Merrill Clary Sosman	*Centennial of the Birth of Röntgen and the Semi-Centennial of His Discovery of X-Rays.*
Dr. A. Warren Stearns	*History of the Early Care of the Insane in Massachusetts.*
Dr. Charles F. Branch	*Some Aspects of the History of Cancer.*
Dr. Hyman Morrison	*The Chapter on Appendicitis in a Biography of Reginald Heber Fitz.*
Dr. Henry R. Viets	*Travels of Physicians.*

The Secretary wishes to express his thanks to the President of the Club, Dr. Joseph H. Pratt, for his ready encouragement and support in the arrangement of the above program.

The annual meeting was held on April 8, 1946. The following officers were elected:

President	Benjamin Spector, M. D.
Vice-Presidents	Robert Osgood, M. C. Reginald Fitz, M. D.
Sec.Treas. and Curator	James F. Ballard
Members of the Council	Joseph H. Pratt, M. D. A. Warren Stearns, M. D. Henry R. Viets, M. D. Madelaine R. Brown, M. D.

Next year will mark the twenty-fifth year of continuous service of this Club to the medical profession in and around Boston. The first president was Dr. Harvey Cushing. Plans are being made to set aside one meeting to commemorate the 100th anniversary of William T. G. Morton's successful demonstration of ether anaesthesia at the Massachusetts General Hospital, under the courageous support of Dr. John Collins Warren. Another meeting will be set aside for those who organized the society.

We look forward with renewed energy to enlist the membership of more physicians and students during the coming session.

BENJAMIN SPECTOR, M. D.,
Secretary-Treasurer.

The History of Medicine Society of Tulane University, New Orleans, Louisiana.

The History of Medicine Society of Tulane University has had an active and eventful year. There have been two extremely large meetings, one a joint session

with the American College of Radiology, a celebration meeting of the Anniversary of Roentgen and the second, the annual banquet meeting which was attended by 170 members of the faculty and student body and guests.

The papers of the year 1945-46 Session of the University were as follows:

Sir William Osler	Dr. John H. Musser
Hotel Dieu of Paris	Lyall Howell
Cannon and Carlson	Dr. Hyman Mayerson
Egyptian Medicine	Milton Talbot
* *History of Radiology*	Dr. Leon Menville
* *Biographical Sketch of Roentgen*	Sam Logan
* *Evolution of Diagnostic Radiology*	Dr. Lucien Fortier
* *Development of Therapeutic Radiology*	Dr. Manual Garcia
	Dr. J. V. Schlosser
History of Development of Knowledge of the Parathyroid Gland	Emanuel Bresler
Thomas Addis Emmet	William Patton
Origin of Psychoanalysis	Earl Harris
History of Medicine in China	John Rice
The History of Cancer Research	Dr. Charles Dunlap
Men who Made Tulane	Dr. Isidore Cohn
Sir Ronald Ross	Douglas Gordon
Sigmund Freud	Gene Usdin
Holmes and Mitchell **	Dr. B. B. Weinstein

The Officers for the Session 1945-46 were as follows:

Sam Logan	President
Lewis Claypool	Vice-President
James Stewart	Downtown Secretary
Bill Vildibill	Uptown Secretary
Bill Patton	Treasurer

The Officers for the Session 1946-47 are as follows:

Lewis Claypool	President
James Stewart	Vice-President
Alton Ochsner, Jr	Downtown Secretary
(to be elected)	Uptown Secretary
Bill Vildibill	Treasurer

Each year the History of Medicine Society has undertaken a project to supply the Library of the School of Medicine with some unusual volume which would not ordinarily be purchased by the Library with the funds that are available.

This year the History of Medicine Society purchased and presented to the Library a copy of The New York Academy of Medicine Edition of the Vesalius Anatomy.

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* In joint session with American College of Radiology.

** Banquet address.

It was felt that some provision should be made by the Society for perpetuating a source of income for the Library to obtain rare material in the History of Medicine and rather than have a drive from year to year to obtain a single volume, a drive was undertaken to set up a fund the interest of which would be used by the Library for the purchase of rare medical books. This Fund, known as the History of Medicine Society Library Fund has been set up by an initial contribution from the members and by various contributions from interested individuals and from faculty members. It has now reached approximately seven hundred and fifty dollars and the drive will continue to increase the amount of the fund. This fund has been turned over to the University and the interest yield as accumulated will be used for the purchase of rare medical books.

This Society is now an effective and important organization on the campus and has fine plans for the coming year's activity.

B. B. Weinstein, M. D.

Indiana Association of the History of Medicine, Indianapolis, Indiana.

Only one meeting of the Indiana Association of the History of Medicine has been held since our last report published in the *Bulletin of the History of Medicine*, July, 1945. This meeting was held in connection with the Twenty-seventh Annual Conference of the Indiana History Conference, at the Smith Library, State Library and Historical Building, at Indianapolis, Indiana, on December 8, 1945.

This was a most interesting meeting, Mr. Howard H. Peckham, of the Historical Bureau, being the main speaker and presenting a treatise on Alexis St. Martin—Dr. William Beaumont's famous patient. He gave a complete biographical sketch of this noted man with the window in his stomach, as well as the story of the man who peered into it. Much has been said concerning Doctor Beaumont's ministration and experimentation in this case, but so far as is known this is the first article covering the patient's life history, and Mr. Peckham deserves much credit for his research concerning St. Martin and the noted experimentation which eight years later (in 1833) culminated in Doctor Beaumont's publication of "Experiments and Observations on the Gastric Juice and the Physiology of Digestion."

Mr. Peckham's article outlined the series of exacting experiments performed by Doctor Beaumont and the difficulties he encountered in carrying out his research because of his patient's financial status and roving nature; however, his findings became a permanent contribution to medical knowledge.

Another meeting of the Indiana Association of the History of Medicine is contemplated, but this is all we have to report at this time.

Nella H. Rokke,
Secretary-Treasurer.

The Johns Hopkins Medical History Club, Baltimore, Md.

During the last academic year, the Johns Hopkins Medical History Club held two meetings only; the Hideyo Noguchi lecture on Brown-Séquard delivered by Dr. Olmsted at the Institute of the History of Medicine taking the place of the mid-winter meeting.

The first meeting of the club on December 17, 1945 was devoted to the two-hundredth anniversary of the birth of Benjamin Rush. Dr. Clifford B. Farr of Philadelphia spoke on "Benjamin Rush as a Psychiatrist," Dr. Corner discussed Rush as seen in his autobiography and commonplace book, and Dr. Temkin spoke on the relationship between Rush and the system of John Brown. An exhibit, which illustrated the life as well as the work of Rush, had been arranged by the Institute.

At the meeting on April 22, 1946, Dr. Edelstein spoke on the influence of medicine on ancient philosophy, and Dr. Larkey related experiences as medical historian of the European Theatre. New officers were elected at this meeting, viz Dr. George W. Corner, president; Dr. Sanford V. Larkey, vice president; and Dr. Owsei Temkin, secretary and delegate to the American Association of the History of Medicine.

OWSEI TEMKIN.

Medical History Club of Charleston, Charleston, S. C.

The Medical History Club of Charleston attained its 20th year of life in November, 1945. The occasion was celebrated by a banquet in the honor of Dr. Robert Wilson, the chief actor in founding, promoting and nourishing the club through its existence. Regular meetings were held throughout the year and the following papers were read:

October 4, 1945—*Benjamin Rush*—by Leon Banov, M. D.
November 8, 1945—No formal paper read at this meeting.
December 6, 1945—*The History of the Atom and Atomic Energy*—by H. Rudisill, M. D.
January 10, 1946—*On John Caius, "A Physician of the 16th Century and the Englishe Sweate."*—by Robert Wilson, M. D.
February 7, 1946—*The History of the Hashish Vice*—by R. P. Walton, M. D.
March 7, 1946—*William Stewart Halsted*—by Daniel Maguire, Jr.
April 11, 1946—Miscellaneous short items by members.
May 11, 1946—*Russian Medicine*—by Leon Banov, Jr., M. D.

The Club has continued at its usual number of about 20 members. Dr. Robert Wilson, founder of the Club, died May 20, 1946.

J. I. WARING, M. D.,
Secretary.

The New York Society for Medical History, New York, N. Y.

Report presented by Dr. Beate Caspari-Rosen. Manuscript has not been received.

Ohio Committee on Medical History and Archives.

Brief oral report by Howard Dittrick, M. D.

Providence Medical History Club, Providence, R. I.

During the war no meetings were held. On December 1, 1945 a meeting of the Club was held with Dr. John E. Donley at his residence, 6 Channing Avenue,

Providence, R. I. A paper on Sanctorius of Padua was read. It is hoped that in the future meetings may be held more frequently.

ROLAND HAMMOND, M. D.
Secretary.

The Walter Jarvis Barlow Society for the History of Medicine.

The Walter Jarvis Barlow Society for the History of Medicine, a constituent society of the American Association of the History of Medicine, promotes study and interest in the history of medicine in the Los Angeles area. The Society was founded in 1939 by succeeding an organization known up to that time as the Library Associates of the Los Angeles County Medical Association, which was organized in 1936.

The Society has aided and encouraged the expansion of the historical collection in the County Medical Association Library. Although the Barlow Society has always emphasized California and western medicine, the meetings during the year 1945-46 were devoted to miscellaneous topics.

The principal event of the year is always the George Dock Lecture which is given on or about April 1, Doctor Dock's birthday anniversary. Doctor Dock's presence this year made the occasion exceptionally delightful. The annual business of the Society is transacted at this time.

Following are the topics and speakers at the monthly meeting during the past year:

November 1, 1945, "The Art of Illustration in the History of Proctology," Dr. Malcolm R. Hill, Professor of Proctology, College of Medical Evangelists.

November 20, 1945, "Early Connections between Indigenous Mexican-Guatamalan Medicine and Western Medicine," Dr. Nathan van Patten, Director, Stanford University Libraries.

January 24, 1946, "Bernardo Houssay, Argentine Physiologist," Dr. Herbert M. Evans, Director of the Institute of Experimental Biology, University of California.

March 14, 1946, "The Negro Physician in the History of American Medicine," Dr. E. I. Robinson, President of the National Medical Association.

April 4, 1946 (The George Dock Lecture), "Carlos Finlay and Yellow Fever," Dr. Donald Frick, Sr., a prominent retired Los Angeles physician.

The officers elected for the year 1946-47 are:

President: Dr. Hyman Miller.
Vice-President and National Delegate: Dr. W. F. Norwood.
Secretary-Treasurer: Dr. Edgar Mauer.
Librarian: Mrs. Mary Irish.

WM. FREDERICK NORWOOD,
Secretary-Treasurer.

The William H. Welch Society of New York University College of Medicine, New York, N. Y.

Report presented by Miss Helen Bayne. Manuscript has not been received.

VI. *New Business*

1. ***Election of new members.***

The following new members were elected:

Active Members

Phyllis Allen, Philadelphia, Pa.
Mildred R. Crowe, Birmingham, Ala.
Leslie A. Falk, M. D., Washington, D. C.
Chevalier L. Jackson, M. D., Philadelphia, Pa.
Jane Oppenheimer, Bryn Mawr, Pa.

Corresponding Member

Juan B. Lastres, M. D., Lima, Peru

2. ***Future meetings.***

The Council voted to accept the invitation of Dr. Howard Dittrick to hold the next annual meeting of the Association in Cleveland. The city will be celebrating the 150th anniversary of its founding, and Dr. Dittrick thought it probable that the meeting could be arranged to coincide with meetings of one or more other groups whose members would be interested in the program of our Association. It seemed to be the general feeling of the Council that the Association should meet in other parts of the country on occasion, as it had in the past, to enable members not situated on the East Coast to attend the meetings more frequently.

An invitation from the Peruvian Society of the History of Medicine to hold a meeting in Peru was presented by Dr. Leon Goldman of Cincinnati and was warmly received by the Council. After some discussion, it was decided that the Peruvian Society should be advised of the Council's deep appreciation of the invitation, and that the president should appoint a special committee to study the practical aspects involved in holding such a meeting, the committee to report in due course to the Council or its Executive Committee. The feeling was general that a Pan-American congress on the history of medicine might prove a desirable and practical step towards the resumption of the fully international meetings interrupted by the war.

3. *Miscellaneous.*

The Council approved a departure from precedent, so far as the Association is concerned, in authorizing the incoming officers to assume their duties as soon as feasible after the close of the annual meeting, instead of waiting until January 1st, as heretofore. It is thought that the officers will thus have more time in which to organize and prepare for the annual meeting.

VII. *The Benjamin Rush Symposium*

The innovation of holding a Sunday evening meeting, bridging the gap between the meeting of the Council on Sunday afternoon and the Monday sessions, was evidently appreciated by the members and guests, judging from the attendance and the interest displayed in the papers and the Exhibit. Considerable discussion followed the reading of the papers, and the excellent exhibit prepared by Miss Genevieve Miller and Mrs. Ilza Veith, which was set up at the back of the long room, received much appreciative attention.

Dinner Session of the AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE, May 27, 1946.

THE BUSINESS SESSION OF THE ANNUAL MEETING

Monday, May 27, 1946

Hotel Claridge, Binnacle Room

E. B. KRUMBHAAR, M. D., Presiding

Dr. Krumbhaar called the meeting to order at 2.15. At his request, the members rose to honor the memory of the following members whose deaths had been reported by the secretary:

Walter Baumgarten, M. D.
Kendall Frost, M. D.
Roland N. Klemmer, M. D.
Robert Wilson, M. D.
Leo Wolfson, M. D.

1. *Reports.*

The president read a summary report of the meeting of the Council on the preceding day, as prepared by the secretary.

The treasurer's report was accepted unanimously on recommendation of the Auditing Committee.

2. *Awarding of the William Osler Medal to Mr. Peter Kellaway*

Dr. Sigerist:

The William Osler Medal was established by the Association in order to stimulate interest and research in medical history among students of the medical schools of the United States and Canada. No award was made last year but the essays submitted this year showed a considerably higher standard and the Association is happy to award the William Osler Medal for 1946 to Mr. Peter Kellaway of McGill University Faculty of Medicine for his essay, "The Part Played by Electric Fish in the Early History of Bioelectricity and Electrotherapy." The essay is a solid piece of research based on primary sources and represents an original contribution to the subject.

The Association also wishes to award an Honorary Mention to Mr. L. L. Uzman for his essay, "Constantine the African" which while it does not advance our knowledge of the subject yet shows a good understanding of a very complicated problem of the history of medical literature.

3. *Elections*

The following officers were unanimously elected to serve for the ensuing two years:

President, Richard H. Shryock, Ph. D., Philadelphia, Pa.
Vice-President, Henry R. Viets, M. D., Boston, Mass.

Secretary, Howard Dittrick, M. D., Cleveland, Ohio
Treasurer, Benjamin Spector,* M. D., Boston, Mass.
Editor, Henry E. Sigerist, M. D., Baltimore, Md.

As members of the Executive Committee, in addition to the *ex officio* members, were elected:

John F. Fulton, New Haven, Conn.
J. B. de C. M. Saunders, San Francisco, Calif.
Ralph H. Major, Kansas City, Kansas.

THE DINNER SESSION

The dinner was attended by 55 members and guests, additional guests coming in for the after-dinner talks. A photograph of the gathering was taken just after the members and guests were seated, copies of which were subscribed to by many of those present.

In his opening remarks, before introducing the first speaker, Dr. Krumbhaar spoke with feeling of his long and deep interest in the Association, recalling that he had never missed one of its meetings since its founding. He spoke of the remarkable work of Dr. Sigerist in building up the Association in recent years, and particularly of the advantage the Association had gained in having the *Bulletin of the History of Medicine* as its official organ, which had been made possible by Dr. Sigerist's foresight. Turning to the present meeting, he referred to the formal atmosphere which had prevailed throughout, to some of the difficulties which the committee on arrangements had had to face, and expressed his personal appreciation of their efforts to the committee: Dr. Leaman, the chairman; Miss Miller, Dr. Galdston, Dr. Sigerist and Mr. McDaniel. He pointed out that, except for the non-appearance of three speakers, prevented from attending by the uncertain conditions prevailing just before the meeting, the lengthy program had been run off in accordance with the printed schedule. This he attributed to the greatly appreciated coöperation of all the speakers in adhering to the regrettably short time allotted to each of them.

* The Nominating Committee's nominee, Sanford V. Larkey, M. D., regretfully declined to serve, owing to the pressure of other duties, and nominated Dr. Spector, who kindly agreed to serve in his place.

THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE DURING THE ACADEMIC YEAR 1945-1946

A Report Presented by

HENRY E. SIGERIST
Director of the Institute

The chief event of the year was the return of Dr. Sanford V. Larkey, Librarian of the William H. Welch Medical Library, from the Army on February 1, 1946. This relieved the Institute of its responsibility for the administration of the Welch Library and permitted the staff to resume its regular work.

I. STAFF

Henry E. Sigerist, M. D., D. Litt., LL. D. William H. Welch Professor of the History of Medicine, Director of the Institute of the History of Medicine.

Owsei Temkin, M. D., Associate Professor of the History of Medicine.

Ludwig Edelstein, Ph. D., Associate Professor of the History of Medicine.

Genevieve Miller, M. A., Instructor in the History of Medicine.

Sanford V. Larkey, M. A. (Oxon.), M. D., Lecturer in the History of Medicine.

Edward H. Hume, M. A., M. D., LL. D., Lecturer in the History of Medicine.

Dr. Jean Captain Sabine resigned her Fellowship in the History of Medicine for reasons of health on September 1, 1945.

Miss Gwynneth Gminder, research secretary to the Director, left the Institute on March 31, 1946 because her family moved to New York. Since the Institute was running a deficit, her position could not be filled and will probably remain unfilled for some time.

II. PUBLICATIONS

A. *Publications of the Institute.*

Volumes XVIII and XIX of the *Bulletin of the History of Medicine*

were published during the year. The numbers were issued with considerable delay. Printing is still very slow and binding is worse than ever. It is to be hoped, however, that conditions will improve during 1947 so that it should become possible to publish the *Bulletin* on schedule again.

Two *Supplements to the Bulletin* were published during the year:

CHARLES F. MULLETT, Public Baths and Health in England, 16th-18th Century. [*Supplements to the Bulletin of the History of Medicine*, No. 5.] 1946. 85 pp.

GEORGE ROSEN, Fees and Fee Bills: Some Economic Aspects of Medical Practice in Nineteenth Century America. [*Supplements to the Bulletin of the History of Medicine*, No. 6] 1946. 91 pp.

Two more *Supplements* are in the press and will be issued in the near future.

In the *Monograph Series* of the Institute, Volume IV was published:

OWSEI TEMKIN, The Falling Sickness. A History of Epilepsy from the Greeks to the Beginnings of Modern Neurology. The Johns Hopkins Press, 1945, xv + 380 pp.

The publication of this book was made possible by the appropriation of a substantial grant from the Epilepsy Medical Research Fund of the Johns Hopkins University.

In the Series, *Texts and Documents*, Volume II was published:

LUDWIG EDELSTEIN with EMMA J. EDELSTEIN, Asclepius. A Collection and Interpretation of the Testimonies. The Johns Hopkins Press, 1945, 2 vol., viii + 470 pp., viii + 277 pp.

The publication of this volume was aided by a grant from the American Council of Learned Societies from a fund provided by the Carnegie Corporation of New York.

B. *Publications by Members and Students of the Institute.*

LUDWIG EDELSTEIN

(with Emma J. Edelstein), Asclepius. A Collection and Interpretation of the Testimonies. Baltimore: The Johns Hopkins Press, 1945, 2 vol., viii + 470 pp., viii + 277 pp.

GENEVIEVE MILLER

Wm. Beaumont's Formative Years. Two Early Notebooks 1811-1821. With Annotations and an Introductory Essay. New York: Henry Schuman, 1946, xv +87 pp., 21 illustrations.

Dr. John Morgan's Report to General Washington, March 3, 1776. *Bull. Hist. Med.*, 1946, 19: 450-454.

(Editor of:) Bibliography of the History of Medicine of the United States and Canada—1945. *Ibid.*, 1946, 19: 536-567.

HENRY E. SIGERIST

The University at the Crossroads. New York: Henry Schuman, 1946, vii + 162 pp.

Albert de Haller. In: *Grands Hommes de la Suisse*. Lausanne: Librairie Payot, 1945, 139-145.

The Johns Hopkins Institute of the History of Medicine during the Academic Year 1944-1945. *Bull. Hist. Med.*, 1945, 18: 228-238.

Beginning a New Year. *Ibid.*, 1946, 19: 1-8.

(with Genevieve Miller:) A Welcome to the Journal of the History of Medicine and Allied Science. *Ibid.*, 1946, 19: 115-117.

Protection of Health in the U. S. S. R. In: *Responsibility of Victory. Report of the New York Herald Tribune Forum on Current Problems.* New York, 1945, 78-82.

Bedside Manners in the Middle Ages. The Treatise *De cautelis medicorum* attributed to Arnald of Villanova. *Quart. Bull. Northwestern Univ. Med. School*, Spring, 1946, 20: 136-143.

European Spas through the Centuries. *Ciba Symposia*, April-May, 1946, 8: 302-312.

Rise and Fall of the American Spa. *Ibid.*, April-May, 1946, 8: 313-326.

Towards a Renaissance of the American Spa. *Ibid.*, April-May, 1946, 8: 327-336.

OWSEI TEMKIN

The Falling Sickness. A History of Epilepsy from the Greeks to the Beginnings of Modern Neurology. Baltimore: The Johns Hopkins Press, 1945, xv + 380 pp.

A Report on the Medicinal Treatment of Filariasis Bancrofti. Office of Medical Information, Medical Research Council, Division of Medical Sciences. Washington, September, 1945, 69 pp.

An Essay on the Usefulness of Medical History for Medicine. *Bull. Hist. Med.*, 1946, 19: 9-47.

(with William L. Straus, Jr.): Galen's Dissection of the Liver and of the Muscles moving the Forearm. Translated from the "Anatomical Procedures." *Ibid.*, 1946, 19: 167-176.

The Philosophical Background of Magendie's Physiology. *Ibid.*, 1946, 20: 10-35.

ILZA VEITH

The Strategic Bonins. *Far Eastern Survey*, 1945, XIV, 21: 307-309.

Englishman or Samurai: the Story of Will Adams. *Far Eastern Quarterly*, 1946, 5: 5-27.

"That Man" in Old Cathay. *The Personalist*, Spring, 1946, XXVII, 183-190.

Humane Warfare and Inhuman war: Japan and its Treatment of War Prisoners. *Bull. Hist. Med.*, 1946, 19: 355-374.

III. COURSES

Introductory and General Courses

The following elective courses were given during the year:

1. Outlines of the History of Medicine. Dr. Temkin. First Quarter. Two hours weekly.
2. Use of the Library and Methods of Medical History. Dr. Temkin. First Quarter. One hour weekly.
3. Greek and Latin Terminology in Modern Medicine. Dr. Edelstein. First Quarter. Four Lectures.
4. Introduction to the History of American Medicine. Miss Miller. Second Quarter. One hour weekly.

Seminar in the History of Medicine

5. The Historical Approach to Medicine. Dr. Sigerist. First Quarter. One hour weekly.
6. History of Greek Anatomy and Physiology. Dr. Edelstein. Second Quarter. One hour weekly.

Seminar in the Sociology of Medicine

7. Problems of the Sociology and Economics of Medicine. Dr. Sigerist. Third and fourth Quarters. Two hours weekly.

Seminar in the Philosophy of Medicine

8. The Main Systems of Contemporary Philosophy. Dr. Edelstein. First, second and third Quarters. One hour weekly.

IV. NOGUCHI LECTURES

The Eighth Course of the Hideyo Noguchi Lectures was held by Dr. J. M. D. Olmsted, Professor of Physiology at the University of California, from February 19, 1946 to February 21, 1946. The general subject of the Course was *Charles Edouard Brown-Séquard, a Nineteenth Century Neurologist and Endocrinologist*, and the individual lectures were devoted to the following subjects:

First Lecture, Tuesday, February 19, 1946

Mauritian Student and Free-Lance Investigator in Paris

Second Lecture, Wednesday, February 20, 1946

His Neurological Practice and American Professorships

Third Lecture, Thursday, February 21, 1946
In the Chair of Medicine at the Collège de France.

The Lectures will be published in the near future in the *Noguchi Lecture Series* of the Institute.

V. LECTURES

The following lectures were given by members of the Institute outside the regular courses:

LUDWIG EDELSTEIN

December 29, 1945	*The Rôle of Eryximachus in Plato's Symposium.* American Philological Association, Cincinnati, Ohio.
March 21, 1946	*The Place of the Myth in Platonic Philosophy.* The Johns Hopkins Philological Association, Baltimore, Maryland.
April 22, 1946	*The Influence of Medicine on Ancient Philosophy.* The Johns Hopkins Medical History Club, Baltimore, Maryland.
May 4, 1946	*Science and Politics in Antiquity.* The Baltimore Classical Club. Baltimore, Maryland.
May 27, 1946	*William Osler's Philosophy.* American Association of the History of Medicine, Atlantic City, New Jersey.

GENEVIEVE MILLER

January 12, 1946	Participated in a Vocational Conference at Goucher College, discussing the preparation necessary and the possibilities for making a career in historical research.

HENRY E. SIGERIST

September 7, 1945	*The History and Sociology of Medicine.* The Pre-Medical Society of Cornell University, Ithaca, New York.
October 30, 1945	*The Protection of Health in the U. S. S. R.* New York Herald Tribune Forum, New York City.
December 3, 1945	*The Writing of Medical History.* Goucher College, Baltimore, Maryland.
February 13, 1946	*Medical Care for All the People.* Mount Holyoke College, South Hadley, Massachusetts.

March 4, 1946 — *European Developments and Systems of Health Organization.*
University of Rochester, School of Medicine, Rochester, New York.

April 17, 1946 — *The Protection of Health in the U. S. S. R.*
Bryn Mawr College, Bryn Mawr, Pennsylvania.

April 18, 1946 — *The Place of the Physician in Modern Society.*
American Philosophical Society, Philadelphia, Pennsylvania.

May 3, 1946 — *Development of a Health Program.*
Department of Public Welfare, Baltimore, Maryland.

May 17, 1946 — *Mission to India.*
Harriet Lane Home, Johns Hopkins Hospital, Baltimore, Maryland.

May 23, 1946 — *Nationalism and Internationalism in Medicine.*
Second Annual Charles Sumner Lecture, Medico-Chirurgical Society of the District of Columbia, Inc., Washington, D. C.

OWSEI TEMKIN

October 23 and 24, 1945 — Two Illustrated Lectures on the History of Medicine Before Students of the Johns Hopkins School of Nursing. Repeated February 6 and 8, 1946.

October 25, 1945 — *Trends in Medical Ethics.*
Association of Interns and Medical Students, The Johns Hopkins Hospital, Baltimore, Maryland.

December 17, 1945 — *Benjamin Rush and the Brunonian System.*
The Johns Hopkins Medical History Club, Baltimore, Maryland.

March 22, 1946 — *Galen's "Use of the Parts."*
St. John's College, Annapolis, Maryland.

May 26, 1946 — *Materialism in French and German Physiology of the Early Nineteenth Century.*
The American Association of the History of Medicine, Atlantic City, New Jersey.

VI. COLLECTIONS AND GIFTS

The Institute was presented with a large number of gifts which are gratefully acknowledged. They include: Autographs (Dr. J. M. D.

Olmsted); Books and Pamphlets (Army Medical Library, Dr. Harry Friedenwald, Dr. Claude E. Jones, Dr. Juan B. Lastres, Dr. Carlos Enrique Paz Soldán, Dr. W. R. LeFanu, Library of the College of Physicians of Philadelphia, Miss Rebecca Wentworth Spalding, Mr. Norman Taylor, Dr. Christopher Tietze); Ex Libris (Dr. Willard E. Goodwin); Photographs (Dr. Robert E. Schlueter, Dr. H. G. Schlumberger, Dr. Henry R. Viets).

Dr. Warfield T. Longcope, on the occasion of his retirement, very generously presented the Institute with a large number of items of great historical interest including 15 medals, a letter of Pasteur, 41 portraits, 9 pamphlet binders containing reprints of papers dealing with biographical subjects and a number of books among which the most welcome was a copy of Maurice Arthus, *De L'Anaphylaxie a l'Immunité*, Paris, 1921.

VII. EXHIBITS

The exhibit program was carried through as long as Miss Gminder was on the staff of the Institute.

An exhibit on *The Life and Works of Benjamin Rush* was displayed from December 1945 to February 1946 in commemoration of the 200th anniversary of the birth of Rush.

The exhibit was followed by a display of general books and objects illustrating the history of medicine.

The following student exhibits were displayed in the Lobby of the Welch Medical Library:

HIGHLIGHTS IN AMERICAN MEDICINE

I. General Literature
II. McDowell and Sims
III. Beaumont
IV. Holmes and Mitchell
V. Yellow Fever

VIII. BUDGET

The Budget of the past year amounted to $31,887.33. As a result of the increased cost of printing, the Institute ran a deficit which will impair next year's work quite considerably.